THE BELL SYSTEM

Technical Journal

DEVOTED TO THE SCIENTIFIC AND ENGINEERING ASPECTS OF ELECTRICAL COMMUNICATION

ADVISORY BOARD

H. G. MEHLHOUSE J. B. FISK
W. L. LINDHOLM

EDITORIAL COMMITTEE

W. E. DANIELSON, *Chairman*
F. T. ANDREWS, JR.
I. DORROS
C. W. HOOVER, JR.
A. E. JOEL, JR.
B. E. STRASSER
M. TANENBAUM
D. G. THOMAS
C. R. WILLIAMSON

EDITORIAL STAFF

G. E. SCHINDLER, JR., *Editor*
W. V. RUCH, *Assistant Editor*
H. M. PURVIANCE, *Production and Illustrations*
F. J. SCHWETJE, *Circulation*

Index and Contents

VOLUME 49

1970

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
NEW YORK

LIST OF ISSUES IN VOLUME 49

No. 1, January	Pages	1–158
No. 2, February		159–320
No. 3, March		321–476
No. 4, April		477–600
No. 5, May–June		601–920
No. 6, July–August		921–1248
No. 7, September		1249–1608
No. 8, October		1609–1994
No. 9, November		1995–2416
No. 10, December		2417–3020

Index	iii
Contents	xxxiii

NOTE: Words in parentheses precede words not in parentheses on the same line. For example,

Arrays (Directional)

should be read Directional Arrays. In subdivided subjects, words in parentheses precede the section heading and the words not in parentheses on the same line. For example,

Binary
Shift Registers (Tapped)

should be read Tapped Binary Shift Registers.

Index to Volume 49

A

ABELIAN GROUP (BINARY CODES WHICH ARE IDEALS IN THE GROUP ALGEBRA OF AN) 987–1011

ACCELERATED TESTING 1279–303, 1405–17

ACOUSTICAL MEASUREMENTS (DETERMINATION OF THE SHAPE OF THE HUMAN VOCAL TRACT FROM) 1195–214

ACOUSTOOPTIC MODULATORS 1995–6, 2033–91

ACTIVE NETWORKS (A GENERAL APPROACH TO TWIN-T DESIGN AND ITS APPLICATION TO HYBRID INTEGRATED LINEAR) 1105–49

Adaptive Delta Modulation with a One-Bit Memory 321–42

Adaptive Predictive Coding of Speech Signals 1973–86

ADAPTIVE RETRANSMISSION ARRAYS IN A FADING ENVIRONMENT (AN ANALYSIS OF) 1811–25

ADDITIVE
- Colored Gaussian Noise Channel 1705–12
- Gaussian Noise (A New Approach for Evaluating the Error Probability in the Presence of Intersymbol Interference and Additive Gaussian Noise) 2249–65
- Gaussian Noise (The Capacity of Linear Channels with) 81–94

ADMINISTRATIVE-DATA NETWORK 2735–54, 2975–3004

ADNET *See* ADMINISTRATIVE-DATA NETWORK

AIR BEARINGS 2145–77

Aitcheson, E. J. 2831–56, 2887–913

ALARM DETECTORS 749–65

ALGEBRA OF AN ABELIAN GROUP (BINARY CODES WHICH ARE IDEALS IN THE GROUP) 987–1011

ALGORITHM (BOTTLENECK ASSIGNMENT) 185–90

Alignment and Performance Evaluation (Device Photolithography: The Primary Pattern Generator) 2069–75

ALIGNMENT (AXIAL) 2043–59

ALL-PASS NETWORKS 1531–54

All Terminal Bubbles Programs Yield the Elementary Symmetric Polynomials 1991–4

Allen, R. C. 767–81

Alles, D. S. 2145–77

ALPHA-NUMERIC DISPLAYS 2145–77

ALPHABET (K-ARY TRANSMISSION) 2267–87

ALUMINUM DELAY LINES (ULTRASONIC) 2857–85

Amelio, G. F. 593–600

AMPLIFIERS 631–61

AMPLITUDE
- Modulation 2249–65
- Modulation (Single-Sideband) 1069–104

Analysis of a Burst-Trapping Error Correction Procedure 493–519

Analysis of a Thin Circular Loop Antenna Over a Homogeneous Earth 1215–33

Analysis of Adaptive Retransmission Arrays in a Fading Environment (An) 1811–25

Analytical Approximations to Approximations in the Chebyshev Sense 1–32

Anderson, C. D. 605–30

ANI *See* AUTOMATIC NUMBER IDENTIFICATION

ANODIC CORROSION 1279–303

Anomaly in the Mobility of Gaseous Ions (On an) 343–54

ANTENNA OVER A HOMOGENEOUS EARTH (ANALYSIS OF A THIN CIRCULAR LOOP) 1215–33

ANTENNAS
(A Stationary Phase Method for the Computation of the Far Field of Open Cassegrain) 431–54
(Earth-Station) 1491–511
(On the Computation of the Far Field of Open Cassegrain) 1595–602
(Parabolic Reflector Receiving) 1513–30
APPROXIMATION OF BANDLIMITED FUNCTIONS (INFORMATION THEORY AND) 1911–41
APPROXIMATIONS TO APPROXIMATIONS IN THE CHEBYSHEV SENSE (ANALYTICAL) 1–32
ARC LAMPS (MERCURY) 2117–28
ARGON LASERS 2033–91
ARMORLESS COAXIAL CABLES 699–719
ARMSTRONG MODULATORS 1893–903
Arnaud, J. A. 2311–48
ARRAY DARK CURRENT 921–52
ARRAYS IN A FADING ENVIRONMENT (AN ANALYSIS OF ADAPTIVE RETRANSMISSION) 1811–25
ARTWORK GENERATION 1997–2009
Ashley, F. R. 2193–202
ASTIGMATIC RAY-PENCILS 2311–48
Asymmetric Encoding Scheme for Word Stuffing (An) 379–98
Asymptotic Analysis of a Nonlinear Autonomous Vibratory System 73–80
Atal, B. S. 1973–86
ATTENUATION
And Radio Path Design (Rain) 121–35
(Atmospheric) 1239–45
AUDIT
Programs 2625–83
Stitch Control 2445–507
Ault, C. F. 2887–913
AUTOCOLLIMATORS 2069–75
AUTOMATIC
Equalization and Carrier Acquisition For Digital Communication (Joint Optimization of) 1069–104
Load Sharing 749–65
Local Toll Simulator Set 2711–28
Number Identification 2625–83
Operator Simulator Set 2711–28
Reticle Pattern Alignment 2145–77
Autonomous Data-Scanner and Distributor (No. 1 ESS ADF:) 2857–85
AVALANCHE DIODES (POWER-FREQUENCY CHARACTERISTICS OF THE TRAPATT DIODE MODE OF HIGH EFFICIENCY POWER GENERATION IN GERMANIUM AND SILICON AVALANCHE DIODES) 799–826
AVOIDING SERIAL SUN-TRANSIT OUTAGES AND ECLIPSES (A SATELLITE SYSTEM FOR) 1943–72
AXIAL ALIGNMENT 2043–59

B

Babusci, L. D. 1253–78
Baker, W. A. 2509–60
Baldinger, W. R. 2685–709
BANACH SPACES 1911–41
BANDLIMITED FUNCTIONS (INFORMATION THEORY AND APPROXIMATION OF) 1911–41
BANDWIDTH
Of Motion Pictures by Hadamard Smearing (Some Mathematical Properties of a Scheme for Reducing the) 969–86
(On the Performance of Digital Modulation Systems that Expand) 1033–57
Barnett, W. T. 1827–71
Barney, D. R. 2975–3004
BASE PUSH-OUT EFFECT 827–52
BASEBAND BANDWIDTHS (A LINEAR PHASE MODULATOR FOR LARGE) 1893–903
BASELINE WANDER 2267–87
BATCH MODE DEBUGGING 2711–28
BATTERIES FOR BELL SYSTEM USE: DESIGN OF THE NEW CELL (RESERVE) 1253–78
BATTERY
Capacity 1335–58
Cell Electrolyte (Organic Contamination of) 1377–92

Cell Electrolytes 1377–92
Electrochemical Compatibility of Plastics (Lead-Acid) 1377–92
Failures 1253–78
Field Trials of the Battery (Electrochemical Characterization of the Bell System) 1335–58
Float Behavior 1335–58, 1377–92
Float Service 1253–303, 1305–19
Into the Telephone Plant (Incorporating the New) 1447–70
Jar-Cover Seals (Lead-Acid) 1393–403
Maintenance 1321–24
Polyvinyl Chloride Battery Jars and Covers (Lead-Acid) 1359–76
Positive Grid Design Principles (Lead-Acid) 1279–303
(Post Seals for the New Bell System) 1405–17
System (Float Behavior of the Lead-Acid) 1321–34
Techniques for Bonding the Positive Plates (Lead-Acid) 1419–46
Tetrabasic Lead Sulfate as a Paste Material for Positive Plates (Lead-Acid) 1305–19
Beadle, W. E. 921–52
Beam Waveguides (An Improved Thermal Gas Lens for Optical) 137–53
Bearings (Air) 2145–77
Bell System
Battery: Field Trials of the Battery (Electrochemical Characterization of the) 1335–58
Battery (Post Seals for the New) 1405–17
Use: Design of the New Cell (Reserve Batteries for) 1253–78
Beneš, V. E. 1471–82
Benzil 2095–109
Benzophenone 2095–109
Benzotriazole 2095–109
Berlekamp, E. R. 969–86
Berrang, J. E. 879–87
Beryllium-Copper Cones 699–719
Biagetti, R. V. 1279–303, 1305–19, 1335–58
Binary
Codes 1555–88
Digital Data Systems 2249–65
Phase Comparator (Pull-in Range of a Phase-Locked Loop with a) 2289–302
Binary Codes Which are Ideals in the Group Algebra of an Abelian Group 987–1011
Bipolar
Transistors (A Charge Control Relation for) 115–20
Transistors (An Integral Charge Control Model of) 827–52
Birefringence 953–67
Blecher, F. H. 1995–6
Block
Equalizers (SF Submarine Cable System: Manufacture of Submarine Cable Repeaters and Ocean) 663–81
Errors 493–519
Blue's Approximate Large Signal Analysis 1777–810
Bodtmann, W. F. 1893–903
Bonding the Positive Plates (Lead-Acid Battery: Techniques for) 1419–46
Boolean Functions 1627–44, 1991–4
Bottleneck
Assignment Algorithm 185–90
Problem 455–69
Bound Technique (Chernoff) 2249–65
Boundary Value Problems 1483–90
Boyle, W. S. 587–93
Brackett, C. A. 1777–810
Bragg Couplers 1602–8
Brewer, S. T. 601–4
Bridwell, J. D. 889–909
Brinsfield, Mrs. J. G. 2203–20
Broyde, B. 2095–109
BTR *See* Bus Terminating Resistor
Bubble Program Yield the Elementary Symmetric Polynomials (All Terminal) 1991–4
Bubbles (Magnetic) 1627–44
Buchner, M. M. 379–98
Burckhardt, C. B. 309–16

Burst Distance and Multiple-Burst Correction 889–909
Burst Erasure 889–909
Burst-Trapping
Codes (Performance of) 477–91
Error Correction Procedure (Analysis of a) 493–519
Bus
Terminating Resistors 2685–711
Translator (Communications) 2561–623
Butherus, A. D. 1377–92
Butyl Rubber 1405–17
Buus, R. G. 631–61

C

Cable
And Couplings (SF Submarine Cable System: Ocean) 699–719
Couplings 699–719
Pairs (Evaluation of) 415–29
Plows (Ocean) 767–81
Repeaters and Ocean Block Equalizers (SF Submarine Cable System: Manufacture of Submarine) 663–81
Repeaters (Submarine) 749–65
Route Engineering (SF Submarine Cable System: Submarine) 767–81
Switches (Coaxial) 229–54
Cadmium Ferrite Cores 2509–60
Calcium Difluoride 355–78
Calculations on Coupling Between Satellite Communications and Terrestrial Radio-Relay Systems Due to Scattering by Rain 1491–511
Calkin, E. T. 749–65
Call
Connections Program 2625–83
Control Program 2625–83
Calls
Are Rearranged (Traffic in Connecting Networks When Existing) 1471–82
(Conference) 2417–43
(Mobile) 2417–43
Camera
(Device Photolithography: The Step-and-Repeat) 2145–77
System (Vidicon) 879–87
Tube Storage Effects 879–87
Cannone, A. G. 1279–303
Capacitors 587–93
(MOS) 593–600
(Solid Tantalum) 683–98
(Thin-Film) 1013–31
Capacity of an Ensemble of Channels with Differing Parameters (On the) 415–29
Capacity of Linear Channels with Additive Gaussian Noise (The) 81–94
Capacity of the Gaussian Channel with Feedback (The) 1705–12
Carney, A. C. 2941–73
Carrier Acquisition for Digital Communication (Joint Optimization of Automatic Equalization and) 1069–104
Carrier-Frequency Holograms (Synthesized) 879–87
Cascaded Filters (An Optimization Method for) 185–90
Cassegrain Antennas
(A Stationary Phase Method for the Computation of the Far Field of Open) 431–54
(On the Computation of the Far Field of Open) 1595–602
Cavities with Image Rotation 2311–48
CBT *See* Communications Bus Translator
Cell (Reserve Batteries for Bell System Use: Design of the New) 1253–78
Center Pouring Process 1253–78
Ceramics (Image Storage and Display Devices Using Fine-Grain Ferroelectric) 953–67
Cesium Chloride 355–78
Chang, R. W. 1069–104
Channels
(Compound) 477–91
(PCM) 379–98
With Additive Gaussian Noise (The

Capacity of Linear) 81–94
With Differing Parameters (On the Capacity of an Ensemble of) 415–29
Chapman, A. T. 663–81
Characterization of Second-Harmonic Effects in IMPATT Diodes 1777–810
CHARGE
Control Model of Bipolar Transistors (An Integral) 827–52
Parceling 1013–31
Transfer (Evaluation of) 593–600
Charge Control Relation for Bipolar Transistors (A) 115–20
CHARGED COUPLED DEVICE CONCEPT (EXPERIMENTAL VERIFICATION OF THE) 593–600
Charge Coupled Semiconductor Devices 587–93
CHARGED METALLIC STRIP ON A SEMICONDUCTOR SURFACE (THE POTENTIAL DUE TO A) 853–77
CHARGING (TRICKEL) 1253–78
CHEBYSHEV SENSE (ANALYTICAL APPROXIMATIONS TO APPROXIMATIONS IN THE) 1–32
CHERNOFF BOUND TECHNIQUE 2249–65
Chien, T. M. 2267–87
CHIP MOUNTING (THERMAL AND ELECTRICAL PROPERTIES OF COATED CONDUCTIVE SUBSTRATES FOR INTEGRATED CIRCUIT) 1151–82
CIRCUITS (RESPONSE OF PERIODICALLY VARYING SYSTEMS TO SHOT NOISE: APPLICATION TO SWITCHED RC) 2221–48
CIRCULAR GRIDS 1279–303
CLADDING 1695–703
CLAMPS (EPOXY RESIN) 1405–17
Clark, G. T. 2685–709
CLOCKS 2857–85
(Disk) 2887–913
CLOSED FORM SOLUTIONS 1595–602
CMM *See* COORDINATE MEASUREMENT MACHINE
COATED CONDUCTIVE SUBSTRATES FOR INTEGRATED CIRCUIT CHIP MOUNTING (THERMAL AND ELECTRICAL PROPERTIES OF) 1151–82
COAXIAL
Cable Switches 229–54
Cables (Armorless) 699–719
System (L-4) 1531–54
CODE RELIABILITY 493–519
CODES
(Binary) 1555–88
(Performance of Burst-Trapping) 477–91
(Product) 889–909
(Reed-Muller) 969–86
(Upper Bound on the Efficiency of DC-Constrained) 2267–87
Which Are Ideals in the Group Algebra of an Abelian Group (Binary) 987–1011
CODEC FOR TELEPHONE TRANSMISSION AND SWITCHING APPLICATIONS (DELTA MODULATION) 1013–31
CODECS AND DIGITAL COMPANDORS (A UNIFIED FORMULATION OF SEGMENT COMPANDING LAWS AND SYNTHESIS OF) 1555–88
CODERS 1555–88
(Measured Quantizing Noise Spectrum for Single-Integration Delta-Modulation) 191–5
CODER-DECODERS 1013–31
CODING OF SPEECH SIGNALS (ADAPTIVE PREDICTIVE) 1973–86
COHERENT
Phase-Shift Keyed Systems 1033–57
Phase-Shift-Keyed PCM Systems 1893–903
Cohoon, D. K. 543–60
Coin Calls 2417–43
COLORED GAUSSIAN NOISE CHANNEL (ADDITIVE) 1705–12
Comella, W. K. 2561–623
COMMUNICATION
(Joint Optimization of Automatic Equalization and Carrier Acquisition for Digital) 1069–104
Theory 309–16, 415–29
COMMUNICATIONS
And Terrestrial Radio-Relay Systems Due to Scattering by Rain (Some

Calculations on Coupling Between Satellite-) 1491–511
Bus Translator 2561–623
COMPANDING 321–42
Laws and Synthesis of Codecs and Digital Compandors (A Unified Formulation of Segment) 1555–88
COMPANDORS (A UNIFIED FORMULATION OF SEGMENT COMPANDING LAWS AND SYNTHESIS OF CODECS AND DIGITAL) 1555–88
COMPATIBILITY OF PLASTICS (LEAD-ACID BATTERY: ELECTROCHEMICAL) 1377–92
COMPOUND CHANNELS 477–91
COMPUTATION
Of the Far Field of Open Cassegrain Antennas (A Stationary Phase Method for the) 431–54
Of the Transient Response of Nonlinear Networks Containing Transistors and Diodes (Theorems on the) 1739–76
Computation of the Far Field of Open Cassegrain Antennas (on the) 1595–602
Computed Transmission Through Rain at Microwave and Visible Frequencies 1873–92
COMPUTER
Arithmetic 1609–25
Control 2061–7
Control (Random-Access) 2077–94
Programs 2011–29, 2203–20
Simulation 197–228, 477–91, 493–519, 799–826, 1195–214
Simulation of Speech Input 321–42
Systems for Pattern Generator Control (Device Photolithography:) 2011–29
Computer Controlled Coordinate Measuring Machine (Device Photolithography: A) 2193–202
COMPUTER-CONTROLLED FOCUS AND MAGNIFICATION ADJUSTMENT 2117–28
COMPUTERS
(Digital) 197–228
(PDP-8) 2193–202
(PDP-8/L) 2145–77
COMPUTER-BASED INFORMATION AND CONTROL SYSTEM 2203–20
COMPUTER-CONTROLLED TESTING 2509–60
Computer Systems for Pattern Generator Control (Device Photolithography:) 2011–29
CONDENSER LENSES (FRESNEL) 2117–28
CONDENSERS 2221–48
CONDUCTANCE (NEGATIVE) 255–72
CONDUCTIVE SUBSTRATES FOR INTEGRATED CIRCUIT CHIP MOUNTING (THERMAL AND ELECTRICAL PROPERTIES OF COATED) 1151–82
CONFERENCE CALLS 2417–43
CONNECTING NETWORKS WHEN EXISTING CALLS ARE REARRANGED (TRAFFIC IN) 1471–82
CONNECTORS 2685–709
CONNECTORIZATION 2685–709
CONSOLES
(100B) 2417–43, 2561–623
(100B TSP) 2685–709
CONTACTS (MINIATURE DRY-REED SEALED) 229–54
CONTAMINATION OF BATTERY CELL ELECTROLYTE (ORGANIC) 1377–92
CONTROL
(Audit Stitch) 2445–507
(Device Photolithography: Computer Systems for Pattern Generator) 2011–29
System of the Primary Pattern Generator (Device Photolithography: The) 2061–7
Systems (Time-Lag) 1905–9
Control System (Device Photolithography: The Primary Pattern Generator: The) 2061–7
CONTROLLED FOCUS AND MAGNIFICATION ADJUSTMENT (COMPUTER-) 2117–28
CONTROLLER (SOLID-STATE ELECTRONIC STATION) 2943–74
CONTROLLERS (NETWORK) 2561–623

Convection Cooling 749–65
Convergence 1069–104
Conversations (Simulated Telephone) 561–84
Conversion (SF System: Power) 749–65
Converters 1013–31
(Digital-to-Analog) 2077–94
Cook, R. F. 2831–56
Cooling (Convection) 749–65
Cooper, R. B. 399–413
Coordinate Measuring Machine (Device Photolithography: A Computer Controlled) 2193–202
Coordinate-Measuring Machine 2069–75
Copolymerization 1359–76
Corbin, J. R. 2857–85
Core Memories 2203–20
Cores (Cadmium Ferrite) 2509–60
Correction
(Burst Distance and Multiple-Burst) 889–909
Procedure (Analysis of a Burst-Trapping Error) 493–519
Corrosion
(Anodic) 1279–303
(Lead) 1405–17
Testing 1279–303
Cost Minimization 291–307
Counter-Flow Lenses. Radial Exhaust of Heated Gas 137–53
Couplers (Holographic Thin-Film) 1602–8
Coupling Between Satellite Communications and Terrestrial Radio-Relay Systems due to Scattering by Rain (Some Calculations on) 1491–511
Couplings (SF Submarine Cable System: Ocean Cable and) 699–719
Covers (Lead-Acid Battery: Polyvinyl Chloride Battery Jars and) 1359–76
Cowan, M. J. 2033–41, 2061–7
Credit Card Calls (Person-to-Person) 2417–43
Creep Resistance 1359–76
Crosslinking 2095–109
Crosstalk by Speech and Noise (Masking of) 561–84
Crosstalk in Multiple-Beam Waveguides 55–71
Cubic and Hexagonal-Based Lattices (The Enumeration of Neighbors on) 355–78
Culp, G. A. 2509–60
Cushman, R. H. 1419–46
Cyclic
Codes 987–1011
Order: Waiting Times (Queues Served in) 399–413
Cyclo-Stationary Systems 2221–48
Cyclohexanone 1377–92
CO2 Lasers 2349–76

D

Dahringer, D. W. 1393–403
Dark Current (Array) 921–52
Darlington, S. 1–32
Data
Dump Store 2711–28
(Intelligibility and Detectability Threshold) 561–84
Scanner Distributor 2733–52
Set 203 2249–65
Sets 2941–73
Synchronization 379–98
Data-Line Number 2753–829
Data-Scanner
Distributor 2831–56
Distributor (No. 1 ESS ADF: Autonomous) 2857–85
Data-Switching Systems (Store-and-Forward) 2753–829
Day, C. M., Jr. 2561–623
DC Transistor Networks (New Theorems on the Equations of Nonlinear) 1713–38
DC-Constrained Codes (Upper Bound on the Efficiency of) 2267–87
Debugging (Program) 2711–28
Decagonal-Prism Mirror 2033–41, 2043–59, 2069–75
Decoders 1555–88

DECODING 1705–12
(Random Error) 493–519
(Subcode) 889–909
Decomposition of a Transfer Function Minimizing Distortion and Inband Losses (A) 455–69
DELAY LINES (ULTRASONIC ALUMINUM) 2857–85
Delta Modulation Codec for Telephone Transmission and Switching Applications 1013–31
DELTA MODULATION WITH A ONE-BIT MEMORY (ADAPTIVE) 321–42
DELTA-MODULATION CODERS (MEASURED QUANTIZING NOISE SPECTRUM FOR SINGLE-INTEGRATION) 191–5
DENSITY DISTRIBUTION (STEADY-STATE PROBABILITY) 543–60
DEPLETION REGIONS 593–600
DETECTABILITY THRESHOLD DATA (INTELLIGIBILITY AND) 561–84
Determination of the Shape of the Human Vocal Tract from Acoustical Measurements 1195–214
DEVICE PHOTOLITHOGRAPHY 1995–2220
DICHROMATED GELATIN 1602–8
DIELECTRIC
Gratings 1602–8
Mirrors 55–71
Slab Waveguides (Radiation Losses of Tapered) 273–90
Waveguides 1645–63
Waveguides (Radiation Losses of the Dominant Mode in Round) 1665–93
Dielectric Guide with Curved Axis and Truncated Parabolic Index 1645–63
DIFFERENTIAL
Equations (Numerical Solutions of Nonlinear Partial-) 95–114
Pictures 969–86
Systems (Eventual Stability for Lipschitz Functional) 1905–9
DIFFERENTIALLY-COHERENT PHASE-SHIFT-KEYED MODULATION 33–54
DIFFUSE REFLECTION 309–16
DIGIT ANALYSIS PROGRAM 2625–83
DIGITAL
Communication (Joint Optimization of Automatic Equalization and Carrier Acquisition for) 1069–104
Compandors (A Unified Formulation of Segment Companding Laws and Synthesis of Codecs and) 1555–88
Computers 197–228
Data Systems (Binary) 2249–65
Filters (On the Interaction of Round-off Noise and Dynamic Range in) 159–84
Modulation Systems That Expand Bandwidth (On the Performance of) 1033–57
Random Numbers (A Fast Method of Generating) 2303–10
Signals (Optimum Phase Equalization of Filters for) 1531–54
Sum (Running) 2267–87
Systems (High-Speed) 2303–10
Transmission Systems 2267–87
DIGITAL-FILTER SYNTHESIS 159–84
DIGITAL-TO-ANALOG CONVERTERS 2077–94
DIODE MODE OF HIGH EFFICIENCY POWER GENERATION IN GERMANIUM AND SILICON AVALANCHE DIODES (POWER-FREQUENCY CHARACTERISTICS OF THE TRAPATT) 799–826
DIODES
And Components (SF System: Transistors and) 683–98
Theorems on the Computation of the Transient Response of Nonlinear Networks Containing Transistors and) 1739–76
DIRECTIONAL FILTERS 631–61
DIRICHLET PROBLEM 1183–94
DISCONNECTS PROGRAM 2625–83
DISCRETE FOURIER TRANSFORM IN THE MEASUREMENT OF FREQUENCIES AND LEVELS OF TONES (USE OF THE) 197–228

Discrete-Time Processes (Projecting Filters for Recursive Prediction of) 2377–403
Disk
Clocks 2887–913
Files 2887–913
Memory System (No. 1 ESS ADF: Message Store: A) 2887–913
Disks 2203–20
Display Devices Using Fine-Grain Ferroelectric Ceramics (Image Storage and) 953–67
Displays
(Alpha-Numeric) 2145–77
(Nixie) 2561–623
Distance and Multiple-Burst Correction (Burst) 889–909
Distortion
And Inband Losses (A Decomposition of a Transfer Function Minimizing) 455–69
And Scattering of Beams 55–71
Distribution of Numbers (On the) 1609–25
DLN *See* Data-Line Number
Domain Interactions (A Mathematical Study of a Model of Magnetic) 1627–44
Dominant
Mode in Round Dielectric Waveguides (Radiation Losses of the) 1665–93
Mode of a Round Fiber by a Gaussian Beam (Excitation of the) 1695–703
Dowd, P. G. 2061–7
Drawing Reticles on Photographic Plates 2077–94
Dry-Reed Sealed Contacts (Miniature) 229–54
DSD *See* Data-Scanner Distributor
Dump Store (Data) 2711–28
Duplex Synchronization 2857–85
Durney, G. R. 2445–507
Dyed Photographic Emulsions 2179–92
Dynamic Range in Digital Filters (on the Interaction of Round-off Noise and) 159–84

E

Early Effect 827–52
Earth-Space Propagation Study (First Result From 15.3-GHz) 1242–5
Earth-Station Antennas 1491–511
Earthquake Battery Stands 1447–70
Earthquakes 521–41
Easton, R. L. 605–30
Ebers-Moll Model 827–52
Ebert, P. M. 1705–12
EBM
Pattern Generator 2011–29
See Electron Beam Machine
Eccentric Mass 73–80
Echo Sounding 767–81
Eclipses (A Satellite System for Avoiding Serial Sun-Transit Outages and) 1943–72
Efficient Heuristic Procedure for Partitioning Graphs (An) 291–307
Elastic Micromanipulator 2043–59
Electrical
Noise Suppression 749–65
Properties of Coated Conductive Substrates for Integrated Circuit Chip Mounting (Thermal and) 1152–82
Electrochemical Characterization of the Bell System Battery: Field Trials of the Battery (Lead-Acid Battery:) 1335–58
Electrochemical Compatibility of Plastics (Lead-Acid Battery:) 1377–92
Electrochemical Processes in the Lead-Acid Battery 1321–34
Electromechanically Controlled Thinning of Silicon 473–5
Electrode on a Semiconductor Surface (The Field Singularity at the Edge of an) 1183–94
Electrodes (Polarization Data for Battery) 1335–58
Electrolytes (Battery Cell) 1377–92
Electron Beam Machine 2077–94

Electron Beam Pattern Generator (Device Photolithography: The) 2077–94
Electron-Sensitive Materials (Device Photolithography:) 2095–109
ELECTRONIC
Message Switcher 2733–52
Switching System Arranged with Data Features (No. 1) 2733–885, 2887–913, 2915–73
Switching Systems 2417–43
Translator System 2445–507
Elek, J. W. 2145–77
ELEMENTARY SYMMETRIC POLYNOMIALS (ALL TERMINAL BUBBLE PROGRAMS YIELD THE) 1991–4
EMULSIONS (DYED PHOTOGRAPHIC) 2179–92
ENCAPSULATION 2509–60
ENCODING 1705–12
Scheme for Word Stuffing (An Asymmetric) 379–98
Enumeration of Neighbors on Cubic and Hexagonal-Based Lattices (The) 355–78
EPITAXIAL IMPURITY CONCENTRATION 799–826
EPOXY RESIN CLAMPS 1405–17
EQUALIZATION 605–30
And Carrier Acquisition for Digital Communication (Joint Optimization of Automatic) 1069–104
During Installation (SF System: Transmission Tests and Computations and) 783–98
Of Filters for Digital Signals (Optimum Phase) 1531–54
EQUALIZER DESIGN (SF SUBMARINE CABLE SYSTEM: REPEATER AND) 631–61
EQUALIZERS 783–98
(SF Submarine Cable System: Manufacture of Submarine Cable Repeaters and Ocean Block) 663–81
EQUATIONS
(Numerical Solutions of Nonlinear Partial-Differential) 95–114
Of Nonlinear DC Transistor Networks (New Theorems on the) 1713–38
ERROR
Analysis Programs 2831–56
Control 477–91
Correction 2061–7
Correction Procedure (Analysis of a Burst-Trapping) 493–519
(Mean-Square Equalization) 1069–104
Probability in the Presence of Intersymbol Interference and Additive Gaussian Noise (A New Approach for Evaluating the Error) 2249–65
ERRORS (SPOT) 889–909
ERROR-RATE PREDICTION 33–54
ESS ADF *See* Electronic Switching System Arranged with Data Features
ETCHING 473–5
Eventual Stability for Lipschitz Functional Differential Systems 1905–9
Ewin, J. R. 2733–52
Excitation of the Dominant Mode of a Round Fiber by a Gaussian Beam 1695–703
EXCITED HYPERBOLIC TANGENT SYSTEMS (LIMITING BEHAVIORS OF RANDOMLY) 543–60
EXHAUSTIVE SERVICE MODEL 399–413
Experimental Verification of the Charge Coupled Device Concept 593–600
EXPLOSIONS 521–41
EXTINCTION COEFFICIENT 1873–92
EXTRACTION APPARATUS (ROTATING DISK ELECTRODE) 1377–92

F

FABRY-PEROT RESONATORS 2349–76
FADES IN SPACE-DIVERSITY RECEPTION (THE NUMBER OF) 1513–30
FADING 1513–30
Environment (An Analysis of Adaptive Retransmission Arrays in a) 1811–25
(Rayleigh) 1811–25
Fast Method of Generating Digital Random Numbers (A) 2303–10

FAULT
Detection 2445–507, 2509–623, 2831–56, 2887–913, 2915–41
Location (SF Submarine Cable System: Shore Terminal Facilities and) 721–48
Feder, D. O. 1253–303
Fennick, J. H. 1245–7
FERPICS 953–67
FERREED SWITCHES 2561–623
FERRITE CORES (CADMIUM) 2509–60
FERROELECTRIC
Ceramics (Image Storage and Display Devices Using Fine-Grain) 953–67
Picture Devices 953–67
FIBER BY A GAUSSIAN BEAM (EXCITATION OF THE DOMINANT MODE OF A ROUND) 1695–703
FIBERGLASS-REINFORCED POLYESTER 1447–70
FIELD
Operation Experience (No. 1 ESS ADF: System Testing and Early) 2975–3004
Trials of the Battery (Electrochemical Characterization of the Bell System Battery:) 1335–58
Field Singularity at the Edge of an Electrode on a Semiconductor Surface (The) 1183–94
FILTERS 2221–48
(An Optimization Method for Cascaded) 185–90
(Directional) 631–61
For Digital Signals (Optimum Phase Equalization of) 1531–54
For Recursive Prediction of Discrete-Time Processes (Projecting) 2377–403
(Loop) 2289–302
(On the Interaction of Roundoff Noise and Dynamic Range in Digital) 159–84
(Predicting) 2377–403
FINE-GRAIN FERROELECTRIC CERAMICS (IMAGE STORAGE AND DISPLAY DEVICES USING) 953–67
First Result From 15.3-GHz Earth-Space Propagation Study 1242–5
Fitch, S. M. 2943–74
FIVE-LEVEL LOAD BOX 2975–3004
Flat Plate Problem for a Semiconductor (The) 1483–90
FLOAT
Behavior (Battery) 1335–58, 1377–92
Service (Battery) 1253–78, 1279–303, 1305–19
Float Behavior of the Lead-Acid Battery System (Lead-Acid Battery:) 1321–34
FLOATING POINT NUMBERS 1609–25
FOCUS AND MAGNIFICATION ADJUSTMENT (COMPUTER-CONTROLLED) 2117–28
FOCUSERS 55–71
FOKKER-PLANCK EQUATIONS 543–60
Foreword
(Device Photolithography) 1995–6
(Lead-Acid Battery) 1249–52
(SF Submarine Cable System) 601–4
FORMANT STRUCTURE 1973–86
Foschini, G. J. 81–94
FOURIER
Coefficients 81–94
Transform in the Measurement of Frequencies and Levels of Tones (Use of the Discrete) 197–228
Transforms 1215–33
FRAMEWORKS 2685–709
Fraser, D. B. 953–67
FREE SPACE 1215–33
FREQUENCIES AND LEVELS OF TONES (USE OF THE DISCRETE FOURIER TRANSFORM IN THE MEASUREMENT OF) 197–228
FREQUENCY DIVERSITY (MICROWAVE LINE-OF-SIGHT PROPAGATION WITH AND WITHOUT) 1827–71
FRESNEL
Condenser Lenses 2117–28
Lenses 2033–91
FROBENIUS THEOREM 2267–87
FRONT SURFACE MIRRORS 55–71
FUNCTION MINIMIZING DISTORTION AND INBAND LOSSES (A DECOMPOSITION OF A TRANSFER) 455–69

FUNCTIONS
(Polynomial Approximation of) 1–32
Theory (Interpolatory) 1911–41
FUNCTIONAL DIFFERENTIAL SYSTEMS (EVENTUAL STABILITY FOR LIPSCHITZ) 1905–9
FUSION
Bonding (Heated Ram) 1419–46
Bonding (Mechanical Thermal Pulse) 1419–46

G

Garrett, C. G. B. 1249–52
GAS
Lens for Optical Beam Waveguides (An Improved Thermal) 137–53
Lenses (Helical) 2311–48
GASEOUS IONS (ON AN ANOMALY IN THE MOBILITY OF) 343–54
GATING MODEL 399–413
GAUGES (RAIN) 121–35
GAUSSIAN
Beam (Excitation of the Dominant Mode of a Round Fiber by a) 1695–703
Beams 55–71
Channel with Feedback (The Capacity of the) 1705–12
Noise (The Capacity of Linear Channels with Additive) 81–94
General Approach to Twin-T Design and Its Application to Hybrid Integrated Linear Active Networks (*A*) 1105–49
GENERATORS (NOISE) 2303–10
GEOSTATIONARY SATELLITES 1943–72
GERMANIUM
And Silicon Avalanche Diodes (Power-Frequency Characteristics of the TRAPATT Diode Mode of High Efficiency Power Generation in) 799–826
IMPATT Diodes 1777–810
Gersho, A. 2377–403
Giloth, P. K. 2735–54, 2975–3004
GLASS PLATES 2203–20
Gloge, D. 55–71
Goell, J. E. 33–54
Golioto, I. 749–65
Goodman, D. J. 2377–403
Gopinath, B. 1195–214
Graham, R. L. 1627–44
GRANULARITY OF SCATTERED LIGHT 309–16
GRAPH THEORY 1627–44
GRAPHS (AN EFFICIENT HEURISTIC PROCEDURE FOR PARTITIONING) 291–307
GRATINGS (DIELECTRIC) 1602–8
Gray, D. A. 1059–68
GRID DESIGN PRINCIPLES (LEAD-ACID BATTERY: POSITIVE) 1279–303
Gross, A. G. 2011-29
GROUND MOTIONS (SYNTHESIS OF STOCHASTIC REPRESENTATIONS OF) 521–41
GROUP ALGEBRA OF AN ABELIAN GROUP (BINARY CODES WHICH ARE IDEALS IN THE) 987–1011
GUIDE WITH CURVED AXIS AND TRUNCATED PARABOLIC INDEX (DIELECTRIC) 1645–63
GUIDED WAVES (MULTILEVEL MODULATION TECHNIQUES FOR MILLIMETER) 33–54
Gummel, H. K. 115–20, 827–52
Gusler, L. T. 1491–511

H

Hackett, J. A. 2561–623
HADAMARD
Matrices 969–86
Smearing (Some Mathematical Properties of a Scheme for Reducing the Bandwidth of Motion Pictures by) 969–86
Halfin, S. 185–90
HAMMING CODES 987–1011
Hamming, R. W. 1609–25
HARDWARE TRANSFER TRACE 2711–28
HEAT
Dissipation 1151–82
Sealing (Infrared) 1393–403
HEAT-TREATMENT MACHINING 2043–59

HEATED RAM FUSION BONDING 1419–46
HELICAL GAS LENSES 2311–48
HELIUM-NEON LASERS 879–87, 2193–202
Heller, K. A. 2711–28
HERMITE POLYNOMIALS 2311–48
Herriott, D. R. 2033–41, 2105–16
HEURISTIC PROCEDURE FOR PA TIONING GRAPHS (AN EFFICI 29
HEXAGONAL-BASED LATTICES ENUMERATION OF NEIGHP CUBIC AND) 355–78
HEXAPHENYLDILEAD 2095–10
HIGH-GAIN LASERS 2349–76
HIGH-LEVEL INJECTION EFFECT 20, 8
HIGH-SPEED DIGITAL SYSTEMS 2303–10
HILBERT SPACES 2377–403
Hirt, W. B. 783–98
Ho, E. Y. 2249–65
Hogg, D. C. 1491–511
HOLOGRAMS USING A NARROW-BAND VIDEO SIGNAL (TELEVISION TRANSMISSION OF) 879–87
Holographic Thin-Film Couplers 1602–8
HOMOGENEOUS EARTH (ANALYSIS OF A THIN CIRCULAR LOOP ANTENNA OVER A) 1215–33
HORN EQUATION (WEBSTER) 1195–214
Howland, F. L. 1997–2009, 2145–77
HUBS 2941–73
Hubbard, W. M. 33–54
Hubbauer, P. 1359–76
HUMAN VOCAL TRACT FROM ACOUSTICAL MEASUREMENTS (DETERMINATION OF THE SHAPE OF THE) 1195–214
Huseby, T. W. 1359–76
HYBRID INTEGRATED LINEAR ACTIVE NETWORKS (A GENERAL APPROACH TO TWIN-T DESIGN AND ITS APPLICATION TO) 1105–49
HYPERBOLIC TANGENT SYSTEMS (LIMITING BEHAVIORS OF RANDOMLY EXCITED) 543–60

I

IC MASKS 2077–94
IDEALS IN THE GROUP ALGEBRA OF AN ABELIAN GROUP (BINARY CODES WHICH ARE) 987–1011
IDLE-CHANNEL INPUT 191–5
Ierley, W. H. 431–54
I.F. BAND (REED-CONTACT SWITCH IES FOR THE) 229–54
ATION 2117–28

Control 2145–77
ION (Cavities with) 2311–48
Storage and Display Devices Using Fine-Grain Ferroelectric Ceramics 953–67
IMPACT MODIFIERS 1359–76
IMPATT
Diodes (Characterization of Second-Harmonic Effects in) 1777–810
Diodes (Germanium) 1777–810
Mode 799–826
Improved Thermal Gas Lens for Optical Beam Waveguides (An) 137–53
Impurity Concentration (Epitaxial) 799–826
Inband Losses (A Decomposition of a Transfer Function Minimizing Distortion and) 455–69
INCONEL 2117–28
718 Alloy 1419–46
Incorporating the New Battery into the Telephone Plant (Lead-Acid Battery:) 1447–70
INFORMATION STORAGE 2203–20
Information Theory and Approximation of Bandlimited Functions 1911–41
INFRARED HEAT SEALING 1393–403
INJECTION
Effects (High-Level) 115–20, 827–52
Molding 1359–76
INSTALLATION
SF Submarine Cable System. Transmission Tests and Computations and Equalization During) 783–98
Tests (TSPS) 2711–28

INSULATOR-SEMICONDUCTOR DIELECTRIC CONSTANT RATIOS 1183–94
Integral Charge Control Model of Bipolar Transistors (An) 827–52
INTEGRATED
Circuit Chip Mounting (Thermal and Electrical Properties of Coated Conductive Substrates for) 1151–82
Circuit Structures 473–5
Circuits 1013–31, 1995–6
Circuits (Silicon) 1997–2009
Circuits (Thin-Film) 1105–49, 1997–2009
Linear Active Networks (A General Approcah to Twin-T Design and Its Application to Hybrid) 1105–49
Optics 1645–63
INTEGRATION
(Linear Multipoint) 1739–76
Methods (Numerical) 431–54
INTEGRATORS 1013–31
INTELLIGIBILITY AND DETECTABILITY THRESHOLD DATA 561–84
Interaction of Roundoff Noise and Dynamic Range in Digital Filters (On the) 159–84
INTERFERENCE
And Additive Gaussian Noise (A New Approach for Evaluating the Error Probability in the Presence of Intersymbol) 2249–65
And the P/AR Meter (Intersymbol) 1245–7
Coupling 1491–511
INTERFEROMETRIC METERING (LASER) 2145–77
INTERLEAVING 477–91
INTERPOLATORY FUNCTIONS THEORY 1911–41
INTERSYMBOL INTERFERENCE AND ADDITIVE GAUSSIAN NOISE (A NEW APPROACH FOR EVALUATING THE ERROR PROBABILITY IN THE PRESENCE OF) 2249–65
Intersymbol Interference and the P/AR Meter 1245–7
Introduction (Device Photolithography: The Primary Pattern Generaotr:) 2031
INVERTERS (20 kHz) 749–65
IONS (ON AN ANOMALY IN THE MOBILITY OF GASEOUS) 343–54
ITERATIVE ANALYSIS (MATRIX) 853–77

J

Jackson, L. B. 159–84
JACOBIAN MATRICES 1739–76
Jaeger, R. J., Jr. 2417–43
Jagerman, D. 1911–41
JARS AND COVERS (LEAD-ACID BATTERY: POLYVINYL CLORIDE BATTERY) 1359–76
Jar-Cover Seals (Lead-Acid Battery:) 1393–403
Jayant, N. S. 321–42
Joel, A. E., Jr. 2417–43
Johnson, A. M. 2033–41, 2069–75
Joint Optimization of Automatic Equalization and Carrier Acquisition for Digital Communication 1069–104
JOINTS (TONGUE-AND-GROOVE SEAL) 1393–403

K

K-ARY TRANSMISSION ALPHABET 2267–87
Kaiser, P. 137–53
KALMAN PREDICTORS 2377–403
Kaneko, H. 1555–88
Kassig, J. J. 631–61
Kenyon, N. D. 255–72
Kernighan, B. W. 291–307
Kerwin, R. E. 2179–92
Kettler, H. W. 2445–507
Kettley, A. W. 2625–83
KHRP *See* KODAK HIGH RESOLUTION PLATES
kHz INVERTERS (20) 749–65
Kienzle H. G. 2753–829, 2975–3004
Kinder, G. W. 2509–60
KODAK HIGH RESOLUTION PLATES 2179–92
Kogelnik, H. 1602–8

Koontz, D. E. 1253–78
Kordos, R. W. 229–54
Kossyk, G. J. W. 2043–59
KPR 2095–109
KTFR 2095–109
KUROKAWA'S STABILITY THEORY 1777–810
Kurshan, R. P. 1991–4

L

L-4 COAXIAL SYSTEM 1531–54
Laane, R. R. 191–5, 1013–31
LAGUERRE POLYNOMIALS 2311–48
Laico, J. P. 2043–59
LAMPS (MERCURY ARC) 2117–28
LANGEVIN'S THEORY 343–54
LAPLACE'S EQUATIONS 853–77
LAPLACE-STIELTJES TRANSFORMS 399–341
LASER
  Beams 1695–703, 1995–6
  Interferometric Metering 2145–77
Laser Speckle Pattern—A Narrowband Noise Model 309–16
LASERS
  (CO2) 2349–76
  (Helium-Neon) 879–87, 2193–202
LAYERED SUBSTRATES 1151–82
LEAD
  Corrosion 1405–17
  Dioxide 1305–19
  Monoxide 1305–19
  Sulfate As a Paste Material for Positive Plates (Lead-Acid Battery: Tetrabasic) 1305–19
  Zirconate-Lead Titanate 953–67
LEAD-ACID BATTERY 1249–470
Lebert, A. W. 699–719
Lehman, H. R. 2857–85
LENS FOR OPTICAL BEAM WAVEGUIDES (AN IMPROVED THERMAL GAS) 137–53
LENS-LIKE MEDIUM 1645–63
LENSES 2145–77
  (Fresnel Condenser) 2117–28
  (Helical Gas) 2311–48
  Radial Exhaust of Heated Gas (Counter-Flow) 137–53
Lenses for the Photolithographic System (*Device Photolithography*:) 2105–16
Lesh, N. G. 683–98
LEVEL MEASUREMENTS (NOISE AND SPEECH) 561–84
Lewis, J. A. 1183–94, 1483–90
LIGHT
  (Granularity of Scattered) 309–16
  Pipes 55–71, 137–53
Limiting Behaviors of Randomly Excited Hyperbolic Tangent Systems 543–60
Lin, S. 291–307
Lindenberger, W. S. 1377–92
LINE-OF-SIGHT
  Microwave Links 1513–30
  Propagation With and Without Frequency Diversity (Microwave) 1827–71
  Tropospheric Propagation Paths (Transit-Time Variations in) 1059–68
LINEAR
  Active Networks (A, General Approach to Twin-T Design and Its Application To Hybrid Integrated) 1105–49
  Channels With Additive Gaussian Noise (The Capacity of) 81–94
  Multipoint Integration 1739–76
Linear Phase Modulator for Large Baseband Bandwidths (*A*) 1893–903
LIPSCHITZ FUNCTIONAL DIFFERENTIAL SYSTEMS (EVENTUAL STABILITY FOR) 1905–9
Liu, S. C. 521–41, 543–60
LOAD
  Box (Five-Level) 2975–3004
  Sharing (Automatic) 749–65
LOGIC
  Operations 2445–507
  Registers 2857–85
LOMMEL FUNCTIONS 1595–602
LOOP
  Antenna Over a Homogeneous Earth (Analysis of a Thin Circular) 1215–33
  Filters 2289–302

Losses
(A Decomposition of a Transfer Function Minimizing Distortion and Inband) 455–69
Of Tapered Dielectric Slab Waveguides (Radiation) 273–90
Lueder, E. 455–69
Luer, H. J. 1253–78, 1447–70
Lumped-Circuit Study of Basic Oscillator Behavior (*A*) 255–72
Lundgren, C. W. 1943–72
Lynch, R. L. 721–48

M

Machining (Heat-Treatment) 2043–59
MacWilliams, Mrs. F. J. 987–1011
Magnetic
Bubbles 1627–44, 1991–4
Domain Interactions (A Mathematical Study of a Model of) 1627–44
Tape Storage and Retrieval 2917–42
Magnetic Tape Subsystem (*No. 1 ESS ADF:*) 2915–40
Magnification Adjustment (Computer-Controlled Focus and) 2117–28
Maintenance 721–48
Audits 2831–56
Maintenance Plan (*No. 1 ESS ADF:*) 2831–56
Maldonado, J. R. 953–67
Mandeville, G. D. 33–54
Manufacture of Submarine Cable Repeaters and Ocean Block Equalizers (*SF Submarine Cable System:*) 663–81
Mappings 1713–38
Marcatili, E. A. J. 1645–63
Marcuse, D. 273–90, 1665–93, 1695–703
Markov Stochastic Processes 1471–82
Mass (Eccentric) 73–80
Mask
Making 2203–20
Shop Information System 1997–2009, 2129–43, 2145–77
Mask Shop Information System (*Device Photolithography: The*) 2203–20
Masks 2145–77
(IC) 2077–94
(Silicon-Circuit) 2203–20
Mask-Making
System 1995–6, 2011–29
System (Device Photolitography: An Overview of the New) 1997–2009
Masking 1995–6
Masking of Crosstalk by Speech and Noise 561–84
Mathematical Models 799–826, 921–52, 1183–214
Mathematical Properties of a Scheme for Reducing the Bandwidth of Motion Pictures by Hadamard Smearing (Some) 969–86
Mathematical Study of a Model of Magnetic Domain Interactions (*A*) 1627–44
Matrices
And Vectors (Non-Negative) 2267–87
(Hadamard) 969–86
(Jacobian) 1739–76
Matrix
Analysis 95–114
Iterative Analysis 853–77
(P_0) 1713–38
Mattes, H. G. 1151–82
McKenna, J. 853–77
McMahon, W. 683–98
Mean-Square Equalization Error 1069–104
Measured Quantizing Noise Spectrum for Single-Integration Delta-Modulation Coders 191–5
Measurement of Frequencies and Levels of Tones (Use of the Discrete Fourier Transform in the) 197–228
Measuring Circuits (Monitoring and) 721–48
Mechanical Design (*Device Photolithog-*

raphy: The Primary Pattern Generator:) 2043–59
Mechanical Design of the 3.5X and 1.4X Reduction Cameras (*Device Photolithography: Reduction Cameras:*) 2129–43
MECHANICAL THERMAL PULSE FUSION BONDING 1419–46
MEEHANITE 2129–43
Meitzler, A. H. 953–67
MEMORY
(Adaptive Delta Modulation With a One-Bit) 321–42
Modules 2509–60
Protection 2755–832
Stores 2509–60
System (No. 1 ESS ADF: Message Store: A Disk) 2889–915
MERCURY ARC LAMPS 2117–28
Message Processing Program Organization (*No. 1 ESS ADF:*) 2755–832
MESSAGE
Queues 2753–831
Retrieval 2915–40
Switcher (Electronic) 2733–53
Message Store—A Disk Memory System (*No. 1 ESS ADF*): 2887–913
MESSAGE-SWITCHING SYSTEMS 2753–831
METALLIC STRIP ON A SEMICONDUCTOR SURFACE (THE POTENTIAL DUE TO A CHARGED) 853–77
METANIL YELLOW 2179–92
METHYL ETHYL KETONE 1393–403
MICROMANIPULATOR (ELASTIC) 2043–59
MICROSTRIP LINES 1151–82
MICROWAVE
And Visible Frequencies (Computed Transmission Through Rain at) 1873–92
Microwave Line-of-Sight Propagation With and Without Frequency Diversity 1827–71
Links (Line-of-Sight) 1513–30
Solid-State Oscillators (Tuning of) 255–72
MIDAS MONITORING EQUIPMENT 1827–71
MIE SCATTERING COEFFICIENT 1873–92
MILLIMETER GUIDED WAVES (MULTILEVEL MODULATION TECHNIQUES FOR) 33–54
Milner, P. C. 1321–34
MINIATURE DRY-REED SEALED CONTACTS 229–54
MINIMAX APPROXIMATIONS 1–32
MIRROR (DECAGONAL-PRISM) 2033–91 2043–59, 2069–75
MIRRORS
(Front Surface) 55–71
(Optical Resonators with Variable Reflectivity) 2349–76
MNEMONIC TRANSLATORS 2753–831
MOBILE CALLS 2417–43
MOBILITY OF GASEOUS IONS (ON AN ANOMALY IN THE) 343–54
MODE OF HIGH EFFICIENCY POWER GENERATION IN GERMANIUM AND SILICON AVALANCHE DIODES (POWER-FREQUENCY CHARACTERISTICS OF THE TRAPATT DIODE) 799–826
MODE-MATCHING OPTICS 2033–91
MODEL OF MAGNETIC DOMAIN INTERACTIONS (A MATHEMATICAL STUDY OF A) 1627–44
MODELS (MATHEMATICAL) 921–52, 1183–214
MODULATED TRANSFER FUNCTION 2145–77
MODULATION
Codec for Telephone Transmission and Switching Applications (Delta) 1013–31
(Single-Sideband Amplitude) 1069–104
Systems That Expand Bandwidth (On the Performance of Digital) 1033–57
Techniques for Millimeter Guided Waves (Multilevel) 33–54
Transfer Function 2105–16
With a One-Bit Memory (Adaptive Delta) 321–42
MODULATOR FOR LARGE BASEBAND

Bandwidths (A Linear Phase) 1893–903
Molding (Injection) 1359–76
Monitoring
And Measuring Circuits 721–48
Equipment (Midas) 1827–71
Moorthy, S. C. 1215–33
Morrison, J. A. 73–80
MOS
Capacitors 593–600
Structures (Silicon-Silicon Dioxide) 587–93
Moschytz, G. S. 1105–49
Motion Pictures by Hadamard Smearing (Some Mathematical Properties of a Scheme for Reducing the Bandwidth of) 969–86
Motions (Synthesis of Stochastic Representations of Ground) 521–41
Motors 73–80
MSIS *See* Mask Shop Information System
MTF *See* Modulation Transfer Function
Mueller, R. K. 81–94
Multilevel Modulation Techniques for Millimeter Guided Waves 33–54
Multipath Propagation 1513–30, 1827–71
Multiple-Beam Waveguides (Crosstalk in) 55–71
Multiple-Burst Correction (Burst Distance and) 889–909
Multiple-Resonant Load 255–72
Multiple-Way Partitions 291–307
Multiplexing 721–48
Multipoint Integration (Linear) 1739–76
Multiports 1713–38
Murphy, B. T. 1013–31
Murphy, Miss E. B. 2193–202
Mutual Information 81–94
Myers, F. H. 2509–60

N

Naphthol Yellow S 2179–92
NDRO *See* Nondestructive Readout
Neehanite 2043–59
Negative Conductance 255–72
Nested Solutions 185–90
Network
Analysis 827–52
Controllers 2561–623
Networks
(A General Approach to Twin-T Design and Its Application to Hybrid Integrated Linear Active) 1105–49
(All-Pass) 1531–54
Containing Transistors and Diodes (Theorems on the Computation of the Transient Response of Nonlinear Networks) 1739–76
(New Theorems on the Equations of Nonlinear DC Transistor) 1713–38
(Theorems on the Analysis of Nonlinear Transistor) 95–114
(Tree) 229–54
When Existing Calls are Rearranged (Traffic in Connecting) 1471–82
Nevis, B. 2145–77
New Approach for Evaluating the Error Probability in the Presence of Intersymbol Interference and Additive Gaussian Noise 2249–65
New Theorems on the Equations of of Nonlinear DC Transistor Networks 1713–38
Nicodemus, K. L. 2753–831
Nielsen, R. J. 2145–77
Nixie® Displays 2561–623
No. 1 Electronic Switching System Arranged with Data Features 2733–3004
Nodes 291–307
Noise
And Dynamic Range in Digital Filters (On the Interaction of Roundoff) 159–84
And Speech Level Measurements 561–84
Application to Switched RC Circuits (Response of Periodically Varying Systems to Shot) 2221–48

Channel (Additive Colored Gaussian) 1705–12
Generators 2303–10
(Masking of Crosstalk by Speech and) 561–84
Model (Laser Speckle Pattern: A Narrowband) 309–16
Spectrum for Single-Integration Delta-Modulation Coders (Measured Quantizing) 191–5
Suppression (Electrical) 749–65
(The Capacity of Linear Channels with Additive Gaussian) 81–94
NON-NEGATIVE MATRICES AND VECTORS 2267–87
NONDESTRUCTIVE READOUT 2509–60
NONLINEAR
Autonomous Vibratory System (Asymptotic Analysis of a) 73–80
DC Transistor Networks (New Theorems on the Equations of) 1713–38
Networks Containing Transistors and Diodes (Theorems on the Computation of the Transient Response of Nonlinear) 1739–76
Single-Degree-of-Freedom Mechanical Model 543–60
Transistor Networks (Theorems on the Analysis of) 95–114
Nonorthogonal Optical Waveguides and Resonators 2311–48
NULL DEPTH TUNING 1105–49
NULL FREQUENCY TUNING 1105–49
NUMBER IDENTIFICATION (AUTOMATIC) 2625–83
Number of Fades in Space-Diversity Reception (The) 1513–30
NUMBERS
(A Fast Method of Generating Digital Random) 2303–10
(On the Distribution of) 1609–25
NUMERICAL
Integration Methods 431–54
Solutions of Nonlinear Partial-Differential Equations 95–114

O

Oberst, J. F. 2289–302
OCCUPATION NUMBERS 355–78
OCEAN
Block Equalizers (SF System: Manufacture of Submarine Cable Repeaters and) 663–81
Cable Plows 767–81
Ocean Cable and Couplings (SF Submarine Cable System:) 699–719
Oldfather, D. O. 783–98
OPEN CASSEGRAIN ANTENNAS (ON THE COMPUTATION OF THE FAR FIELD OF) 1595–602
Operational Programs (TSPS No. 1:) 2625–83
OPERATOR SIMULATOR SET (AUTOMATIC) 2711–28
OPTICS (INTEGRATED) 1645–63
OPTICAL
Beam Waveguides (An Improved Thermal Gas Lens for) 137–53
Design of the Primary Pattern Generator (Device Photolithography:) 2033–91
Fibers 1635–93, 1695–703
Waveguides and Resonators (Nonorthogonal) 2311–48
Optical Design (Device Photolithography: The Primary Pattern Generator:) 2033–91
Optical Design and Adjustment (Device Photolithography: Reduction Cameras:) 2117–28
Optical Resonators With Variable Reflectivity Mirrors 2349–76
OPTIMAL ADAPTATION 321–42
Optimization Method for Cascaded Filters (An) 185–90
OPTIMIZATION OF AUTOMATIC EQUALIZATION AND CARRIER ACQUISITION FOR DIGITAL COMMUNICATION (JOINT) 1069–104
Optimum Phase Equalization of Filters for Digital Signals 1531–54
ORGANIC CONTAMINATION OF BATTERY CELL ELECTROLYTE 1377–92
Ort, D. H. 767–81

ORTHOFERRITES 1627–44
OSCILLATOR BEHAVIOR (A LUMPED-CIRCUIT STUDY OF BASIC) 255–72
OSCILLATORS
(Tuning of Microwave Solid-State) 255–72
(Voltage-Controlled) 2289–302
O'Sullivan, T. D. 1335–1358
OUTAGES AND ECLIPSES (A SATELLITE SYSTEM FOR AVOIDING SERIAL SUN-TRANSIT) 1943–72
Overview of the New Mask-Making System (Device Photolithography: An) 1997–2009
Overview: Requirements and Performance (SF Submarine Cable System: An) 605–30

P

P_0 MATRIX 1713–38
P/AR METER (INTERSYMBOL INTERFERENCE AND THE) 1245–7
PARABOLIC
Coordinates 1483–90
Index (Dielectric Guide with Curved Axis and Truncated) 1645–63
Reflector Receiving Antennas 1513–30
PARABOLOID REFLECTOR ANTENNAS 431–54
Pardee, S. 2203–20
Parker, G. 2941–73
Parry, P. 2077–94
PARTIAL-DIFFERENTIAL EQUATIONS (NUMERICAL SOLUTIONS OF NONLINEAR) 95–114
PARTITIONING GRAPHS (AN EFFICIENT HEURISTIC PROCEDURE FOR) 291–307
PASSIVATION 473–5
PASTE MATERIAL FOR POSITIVE PLATES (LEAD-ACID BATTERY: TETRABASIC LEAD SULFATE AS A) 1305–19
Pasternak, E. J. 2625–83
PATH HUNT PROGRAM 2561–623
PATH-DIVERSITY EXPERIMENT (A THREE-RADIOMETER) 1239–42
PATTERN
Generator Control (Device Photolithography: Computer Systems for) 2011–29
Generator: Introduction (Device Photolithography: The Primary) 2031
PBT *See* PIGGYBACK TWISTOR
PCM
Channels 379–98
Systems 1911–41
Systems (Coherent Phase-Shift-Keyed) 1893–903
PDP-8 COMPUTERS 2193–202
PDP-8/L COMPUTERS 2145–77
PDP-9 COMPUTERS 2203–20
PEAK-TO-AVERAGE RATIO 1245–7
Pehlert, W.K. 493–519
Penzias, A.A. 1242–5
Performance of Burst-Trapping Codes 477–91
Performance of Digital Modulation Systems That Expand Bandwidth 1033–57
PERIODICALLY VARYING SYSTEMS TO SHOT NOISE: APPLICATION TO SWITCHED RC CIRCUITS (RESPONSE OF) 2221–48
Peripheral Circuits (TSPS No. 1:) 2561–623
PERISCOPIC WAVEGUIDES 55–71
PERSON-TO-PERSON CREDIT CARD CALLS 2417–43
PERSONNEL TRAINING 663–81
PERTURBATION
Analysis 1905–9
Procedures 73–80
PHASE
Comparator (Pull-In Range of a Phase-Locked Loop With a Binary) 2289–302
Conjugate Retransmission 1811–25
Jitter (Steady-State) 2289–302
Modulator for Large Baseband Bandwidths (A Linear) 1893–903
PHASE-LOCKED LOOP WITH A BINARY PHASE COMPARATOR (PULL-IN RANGE OF A) 2289–302

PHASE-SHIFT-KEYED
Modulation (Differentially-Coherent) 33–54
PCM Systems (Coherent) 1893–903
Systems (Coherent) 1033–57
PHOTODETECTORS (SILICON PIN) 2069–75
PHOTOGRAPHIC
Emulsions (Dyed) 2179–92
Plates (Drawing Reticles on) 2077–94
PHOTOLITHOGRAPHY (DEVICE) 1995–2220
PHOTOMULTIPLIERS 2061–7
PHOTORESISTS 2095–109, 2179–92
PHOTOSENSITIVE MATERIALS (DEVICE PHOTOLITHOGRAPHY: THIN) 2179–92
Physical Design (TSPS No. 1:) 2685–709
PICTURES BY HADAMARD SMEARING (SOME MATHEMATICAL PROPERTIES OF A SCHEME FOR REDUCING THE BANDWIDTH OF MOTION) 969–86
Picturephone® Silicon Target Signal Analysis 921–52
PIGGYBACK TWISTORS 2445–507, 2509–60
PIN PHOTODETECTORS (SILICON) 2069–75
PITCH (SPEECH) 1973–86
PLASTIC BATTERY RACKS 1447–70
PLASTICS (LEAD-ACID BATTERY: ELECTROCHEMICAL COMPATIBILITY OF) 1377–92
PLATE POROSITY 1305–19
PLATES (LEAD-ACID BATTERY: TECHNIQUES FOR BONDING THE POSITIVE) 1419–46
PLL *See* PHASE-LOCKED LOOP
PLUG-IN MODULES 749–65
POINT RAIN RATE DISTRIBUTION 121–35
POLARIZATION DATA FOR BATTERY ELECTRODES 1335–58
POLING 953–67
POLLING PROGRAM 2753–829
POLYESTER
(Fiberglass-Reinforced) 1447–70
Films 2509–60
POLYETHYLENE 1405–17
POLYNOMIAL APPROXIMATION OF FUNCTIONS 1–32
POLYNOMIALS
(All Terminal Bubble Program Yield the Elementary Symmetric) 1991–4
(Hermite) 2311–48
(Laguerre) 2311–48
POLYVINYL CARBAZOLE 953–67
Polyvinyl Chloride Battery Jars and Covers (Lead-Acid Battery:) 1359–76
Poole, K.M. 1997–2009, 2031
Poon, H.C. 827–52
POROSITY (PLATE) 1305–19
Positive Grid Design Principles (Lead-Acid Battery:) 1279–303
POSITIVE PLATES (LEAD-ACID BATTERY: TECHNIQUES FOR BONDING THE) 1419–46
Post Seals for the New Bell System Battery (Lead-Acid Battery:) 1405–17
POSTPROCESSORS 2011–29
Potential Due to a Charged Metallic Strip on a Semiconductor Surface (The) 853–77
POTENTIAL WELLS 587–93
Potter, J.L. 2915–40
Poulsen, M.E. 2129–43
Power Conversion (SF Submarine Cable System:) 749–65
POWER SUPPLIES 1253–78
Power-Frequency Characteristics of the TRAPATT Diode Mode of High Efficiency Power Generation in Germanium and Silicon Avalanche Diodes) 799–826
PPG
See Primary Pattern Generator
Stepping System 2043–59
Writing-Control System 2061–7
Prabhu, V. K. 1033–57
PREDICTING FILTERS 2377–403
PREDICTION
(Error-Rate) 33–54

Of Discrete-Time Processes (Projecting Filters for Recursive) 2377–403
PREDICTIVE CODING OF SPEECH SIGNALS (ADAPTIVE) 1973–86
PREDICTORS (KALMAN) 2377–403
Prell, E. M. 2445–507
PRIMARY PATTERN GENERATOR 1995–2009, 2011–29, 2203–20
(Device Photolithography: Alignment and Performance Evaluation of the) 2069–75
(Device Photolithography: Mechanical Design of the) 2043–59
(Device Photolithography: Optical Design of the) 2033–91
(Device Photolithography: The Control System of the) 2061–7
Introduction (Device Photolithography: The) 2031
PROBABILITY
Density Distribution (Steady-State) 543–60
In the Presence of Intersymbol Interference and Additive Gaussian Noise (A New Approach for Evaluating the Error Probability) 2249–65
PROCESSORS 2417–43, 2445–507
PRODUCT CODES 889–909
PROGRAM
Debugging 2711–28
Organization (No. 1 ESS ADF: Message Processing) 2753–829
(Polling) 2753–829
Testing 2975–3004
Yield the Elementary Symmetric Polynomials (All Terminal Bubbles) 1991–4
PROGRAMS (TSPS No. 1: Operational) 2625–83
Projecting Filters for Recursive Prediction of Discrete-Time Processes 2377–403
PROPAGATION
(Multipath) 1827–71
Paths (Transit-Time Variations in Line-of-Sight Tropospheric) 1059–68
Study (First Result From 15.3-GHz Earth-Space) 1242–5
With and Without Frequency Diversity (Microwave Line-of-Sight) 1827–71
PROPYLENE 1359–76
Pull-In Range of a Phase-Locked Loop With a Binary Phase Comparator 2289–302
PULSE
Amplitude Modulation 1531–54
Code Modulation 1555–88
Shaping 1531–54
Transmission 1245–7
Purvis, M. B. 229–54
PUSH-OUT EFFECT (BASE) 827–52

Q

QUANTIZATION ERRORS 159–84
QUANTIZING
Noise 1013–31
Noise Spectrum for Single-Integration Delta-Modulation Coders (Measured) 191–5
QUATERNARY MODULATION TECHNIQUES 33–54
QUEUES (MESSAGE) 2753–829
Queues Served in Cyclic Order: Waiting Times 399–413

R

Raamot, J. 2011–29, 2077–94
Rabiner, L. R. 2303–10
RACKS (PLASTIC BATTERY) 1447–70
Rader, C. M. 2303–10
RADIAL EXHAUST OF HEATED GAS (COUNTER-FLOW LENSES) 137–53
Radiation Losses of Tapered Dielectric Slab Waveguides 273–90
Radiation Losses of the Dominant Mode in Round Dielectric Waveguides 1665–93
RADIO PATH DESIGN (RAIN ATTENUATION AND) 121–35
RADIO-RELAY SYSTEMS DUE TO SCATTERING BY RAIN (SOME CALCULATIONS ON COUPLING BETWEEN SATELLITE COMMUNICA-

TIONS AND TERRESTRIAL) 1491–511
RADIOMETERS 1242–5
RAIN 1059–68, 1242–5, 1239–42
At Microwave and Visible Frequencies (Computed Transmission Through) 1873–92
Gauges 121–35
(Some Calculations on Coupling Between Satellite Communications and Terrestrial Radio-Relay Systems Due to Scattering by Rain) 1491–511
Rain Attenuation and Radio Path Design 121–35
RAM FUSION BONDING (HEATED) 1419–46
RANDOM
Disturbances 521–41
Error Decoding 493–519
Numbers (A Fast Method of Generating Digital) 2303–10
Vibrations 543–60
RANDOM-ACCESS COMPUTER CONTROL 2077–94
RASTER-SCAN TECHNIQUES 2043–59
Rawson, E. G. 2117–28
RAY-PENCILS (ASTIGMATIC) 2311–48
RAYLEIGH FADING 1811–25
RC CIRCUITS (RESPONSE OF PERIODICALLY VARYING SYSTEMS TO SHOT NOISE: APPLICATION TO SWITCHED) 2221–48
RC-ACTIVE TWO-PORTS 455–69
RDS *See* RUNNING DIGITAL SUM
REAL-TIME CONTROL 2445–507
RECORDING
Media (Silver Halide) 2095–109
Media (Thin) 2179–92
RECURSIVE PREDICTION OF DISCRETE-TIME PROCESSES (PROJECTING FILTERS FOR) 2377–403
REDUCTION CAMERA LENSES 2105–16
Reduction Cameras: Mechanical Design of the 3.5X and 1.4X Reduction Cameras (*Device Photolithography:*) 2129–43
Reduction Cameras: Optical Design and Adjustment (*Device Photolithography:*) 2117–28
Reed-Contact Switch Series for the I.F. Band 229–54
REED-MULLER CODES 969–86
REFLECTIVITY MIRRORS (OPTICAL RESONATORS WITH VARIABLE) 2349–76
REFLECTOR ANTENNAS (PARABOLOID) 431–54
REFRACTIVE INDEX 1059–68
RELIABILITY 663–81
Repeater and Equalizer Design (*SF Submarine Cable System:*) 631–61
REPEATERS 33–54, 605–30, 783–98
And Ocean Block Equalizers (SF Submarine Cable System: Manufacture of Submarine Cable) 663–81
(Submarine Cable) 749–65
Reserve Batteries for Bell System Use: Design of the New Cell (*Lead-Acid Battery:*) 1253–78
RESISTANCES 2221–48
RESISTORS (TANTALUM THIN-FILM) 683–98
RESONATORS
(Nonorthogonal Optical Waveguides and) 2311–48
With Variable Reflectivity Mirrors (Optical) 2349–76
Response of Periodically Varying Systems to Shot Noise: Application to Switched RC Circuits 2221–48
RETICLE
Generation 2095–109
Pattern Alignment (Automatic) 2145–77
RETICLES
On Photographic Plates (Drawing) 2077–94
(Test) 2117–28
RETRANSMISSION
Arrays in a Fading Environment (An Analysis of Adaptive) 1811–25
(Phase Conjugate) 1811–25
Rice, S. O. 2221–48
Riddell, G. 2445–507
Rife, D. C. 197–228

RIPPLE PROBLEMS (EQUAL) 1–32
Robertson, G. 2077–94
Rohn, W. B. 2445–507
Rongved, L. 2043–59
Rosenfeld, P. E. 2061–7
ROTATING DISK ELECTRODE EXTRACTION APPARATUS 1377–92
ROTATIONAL INERTIA 73–80
ROUND
Dielectric Waveguides (Radiation Losses of the Dominant Mode in) 1665–93
Fiber by a Gaussian Beam (Excitation of the Dominant Mode of a) 1695–703
ROUNDOFF NOISE AND DYNAMIC RANGE IN DIGITAL FILTERS (ON THE INTERACTION OF) 159–84
RUBBER 1359–76
(Butyl) 1405–17
RUNNING DIGITAL SUM 2267–87
Ruthroff, C. L. 121–35, 1893–903
Ryan, J. T. 1359–76

S

Samaroo, W. 2077–94
Sandberg, I. W. 95–114, 1739–76
SATELLITE
Communications and Terrestrial Radio-Relay Systems Due to Scattering by Rain (Some Calculations on Coupling Between) 1491–511
Space Diversity 1943–72
Satellite System for Avoiding Serial Sun-Transit Outages and Eclipses (*A*) 1943–72
SATELLITES 1242–5
Savard, H. J., Jr. 2193–202
SCATTERED LIGHT (GRANULARITY OF) 309–16
SCATTERING
By Rain (Some Calculations on Coupling Between Satellite Communications and Terrestrial Radio-Relay Systems Due to) 1491–511
Of Beams (Distortion and) 55–71
Schafer, R. W. 2303–10
Schaible, G. J. 699–719
Scharfetter, D. L. 799–826
SCHEDULING 2203–20
SCHELKUNOFF'S PRINCIPLE 1–32
Schindel, L. M. 767–81
Schlegel, W. A. 2145–77
Schmitt, D. A. 2711–28
Schorr, A. J. 921–52
Schroeder, M. R. 1973–86
SEA RESISTANCE 921–52
SEAL JOINTS (TONGUE-AND-GROOVE) 1393–403
SEALS 631–61
For the New Bell System Battery (Post) 1405–17
(Lead-Acid Battery: Jar-Cover) 1393–403
SEALED CONTACTS (MINIATURE DRY-REED) 229–54
SEALING (INFRARED HEAT) 1393–403
SECOND-HARMONIC EFFECTS IN IMPATT DIODES (CHARACTERIZATION OF) 1777–810
SEGMENT COMPANDING LAWS AND SYNTHESIS OF CODECS AND DIGITAL COMPANDORS (A UNIFIED FORMULATION OF) 1555–88
Seman, J. A. 355–78
SEMICONDUCTOR
Devices (Charge-Coupled) 587–93
Surface (The Field Singularity at the Edge of an Electrode on a) 1183–94
Surface (The Potential Due to a Charged Metallic Strip on a) 853–77
(The Flat Plate Problem for a) 1483–90
Sen, T. K. 561–84
SERIAL SUN-TRANSIT OUTAGES AND ECLIPSES (A SATELLITE SYSTEM FOR AVOIDING) 1943–72
SERVO SYSTEMS 2887–913
SET (AUTOMATIC OPERATOR SIMULATOR) 2711–28
Setzer, D. E. 1873–92
SF SUBMARINE CABLE SYSTEM 601–798
SHAKEDOWN TESTING 2711–28

Shanholt, G. A. 1905–9
Sharpe, L. H. 1405–17
Shell Radii 355–78
Shift Registers 587–93
Shipboard Computers 783–98
Shnidman, D. A. 1531–54
Shore Terminal Facilities and Fault Location (SF Submarine Cable System:) 721–48
Shot Noise: Application to Switched RC Circuits (Response of Periodically Varying Systems to) 2221–48
Shroff, J. R. 1393–403, 1405–17
Shutters 2129–43
Side-Scan Sonar 767–81
Signal Analysis (*Picturephone®* Silicon Target) 921–52
Sikorsky, M. F. 2625–83
Silicon
  Avalanche Diodes (Power-Frequency Characteristics of the TRAPATT Diode Mode of High Efficiency Power Generation in Germanium and) 799–826
  (Electrochemically Controlled Thinning of) 473–5
  Integrated Circuits 1997–2009
  PIN Photodetectors 2069–75
  Target Signal Analysis (*Picturephone®*) 921–52
Silicon-Circuit Masks 2203–20
Silicon-Silicon Dioxide MOS Structures 587–93
Silver Halide Recording Media 2095–109
Simulated Telephone Conversation 561–84
Simulation 521–41
  (Computer) 197–228, 477–91, 1195–214
  Of Speech Input (Computer) 321–42
Single-Integration Delta-Modulation Coders (Measured Quantizing Noise Spectrum for) 191–5
Single-Sideband Amplitude Modulation 1069–104
Sinusoidal Input 191–5
Skinner, J. G. 2145–77
Slab Waveguides (Radiation Losses of Tapered Dielectric) 273–90
Sleds (Survey) 767–81
Slepian's Method 1033–57
Smith, G. E. 587–600
Smith, M. T., Jr. 2753–829
Smoothing Functions 197–228
Sodium Chloride 355–78
Solid Tantalum Capacitors 683–98
Solid-State Electronic Station Controller 2941–73
Some Calculations on Coupling Between Satellite-Communications and Terrestrial Radio-Relay Systems Due to Scattering by Rain 1491–511
Some Mathematical Properties of a Scheme for Reducing the Bandwidth of Motion Pictures by Hadamard Smearing 969–86
Sonar (Side-Scan) 767–81
Sondhi, M. M. 1195–214
Sosnowski, T. P. 1602–8
Space-Diversity Reception (The Number of Fades in) 1513–30
SPC *See* Stored Program Control
Speckle Pattern: A Narrowband Noise Model (Laser) 309–16
Spectrum for Single-Integration Delta-Modulation Coders (Measured Quantizing Noise) 191–5
Speech
  And Noise (Masking of Crosstalk by) 561–84
  Input (Computer Simulation of) 321–42
  Level Measurements (Noise and) 561–84
  Pitch 1973–86
  Signals (Adaptive Predictive Coding of) 1973–86
Spencer, R. G. 2887–913
Spot Errors 889–909
SSB-Filters 455–69
Stability
  For Lipschitz Functional Differential Systems (Eventual) 1905–9

Theory (Kurokawa's) 1777–810
STATE PHASE JITTER (STEADY-) 2289–302
Stafford, J. W. 2043–59, 2129–43
STANDS (EARTHQUAKE BATTERY) 1447–70
STATION CONTROLLER (SOLID-STATE ELECTRONIC) 2941–73
Stationary Phase Method for the Computation of the Far Field of Open Cassegrain Antennas (A) 431–54
STATISTICAL PROPERTIES 2221–48
STEADY-STATE PHASE JITTER 2289–302
STEADY-STATE PROBABILITY DENSITY DISTRIBUTION 543–60
Step-and-Repeat Camera (Device Photolithography: The) 2145–77
STEPPING SYSTEM (PPG) 2043–59
STOCHASTIC
Processes (Markov) 1471–82
Representations of Ground Motions (Synthesis of) 521–41
STORAGE
And Display Devices Using Fine-Grain Ferroelectric Ceramics (Image) 953–67
And Retrieval (Magnetic Tape) 2915–40
Effects (Camera Tube) 879–87
STORE (TSPS No. 1: STORED PROGRAM CONTROL No. 1A) 2509–60
STORE-AND-FORWARD DATA-SWITCHING SYSTEMS 2753–829
STORED
Program Control 2711–28
Program Control No. 1A 2417–43, 2561–623
Program Control No. 1A Store (TSPS No. 1:) 2509–60
Program Control No. 1A (TSPS No. 1:) 2445–507
Stored Program Control No. 1A (TSPS No. 1) 2445–507
Stored Program Control No. 1A Store (TSPS No. 1) 2509–60
Stout, C. E., Jr. 2145–77
STRAP ROUTINES (BOOT) 2831–56
Strebendt, Mrs. F. B. 2915–40
STUFFING (AN ASYMMETRIC ENCODING SCHEME FOR WORD) 379–98
SUBCODE DECODING 889–909
SUBMARINE
Cable Repeaters 749–65
Cable Repeaters and Ocean Block Equalizers (SF Submarine Cable System: Manufacture of) 663–81
Submarine Cable Route Engineering (SF Submarine Cable System:) 767–81
SUBSTRATES FOR INTEGRATED CIRCUIT CHIP MOUNTING (THERMAL AND ELECTRICAL PROPERTIES OF COATED CONDUCTIVE) 1151–82
SULFURIC ACID 1359–76
SUN TRACKERS 1239–42
SUN-TRANSIT OUTAGES AND ECLIPSES (A SATELLITE SYSTEM FOR AVOIDING SERIAL) 1943–72
SWITCH SERIES FOR THE I.F. BAND (REED-CONTACT) 229–54
SWITCHBOARDS (TOLL) 2417–43
SWITCHES 2221–48
(Coaxial Cable) 229–54
SWITCHED RC CIRCUITS (RESPONSE OF PERIODICALLY VARYING SYSTEMS TO SHOT NOISE: APPLICATION TO) 2221–48
SWITCHING
Applications (Delta Modulation Codec for Telephone Transmission and) 1013–31
Systems (Electronic) 2417–43
SYMMETRIC POLYNOMIALS (ALL TERMINAL BUBBLES PROGRAMS YIELD THE ELEMENTARY) 1991–4
SYNCHRONIZATION 1059–68
(Data) 379–98
(Duplex) 2857–85
SYNTHESIS
(Digital-Filter) 159–84
Of Codecs and Digital Compandors (A Unified Formulation of Segment Companding Laws and) 1555–88
Synthesis of Stochastic Representations of Ground Motions 521–41

SYNTHESIZED CARRIER-FREQUENCY HOLOGRAMS 879–87
System Organization and Objectives (TSPS No. 1:) 2417–43
System Organization and Objectives (No. 1 ESS ADF:) 2733–52
System Testing (TSPS No. 1:) 2711–28
System Testing and Early Field Operation Experience (No. 1 ESS ADF:) 2975–3004

T

TANGENT SYSTEMS (LIMITING BEHAVIORS OF RANDOMLY EXCITED HYPERBOLIC) 543–60
TANTALUM
Capacitors (Solid) 683–98
Thin-Film Resistors 683–98
TAPERED DIELECTRIC SLAB WAVEGUIDES (RADIATION LOSSES OF) 273–90
TARTRAZINE 2179–92
Taylor, R. M. 2711–28
TE AND TM MODES 273–90
Techniques for Bonding the Positive Plates (Lead-Acid Battery:) 1419–46
TEFLON 1665–93
TELEPHONE
Conversations (Simulated) 561–84
Plant (Incorporating the New Battery into the) 1447–70
Plants 1253–78
Transmission and Switching Applications (Delta Modulation Codec for) 1013–31
Teletypewriter Stations and Transmission Facilities (No. 1 ESS ADF:) 2941–73
TELETYPEWRITERS 2203–20, 2445–507, 2733–52
Television Transmission of Holograms Using a Narrow-Band Video Signal 897–87
TERMINAL
Bubbles Programs Yield the Elementary Symmetric Polynomials (All) 1991–4
Facilities and Fault Location (SF System: Shore) 721–48
TEST RETICLES 2117–28
TESTING 663–81
And Early Field Operation Experience (No. 1 ESS ADF: System) 2975–3004
(Corrosion) 1279–303
(TSPS No. 1: System) 2711–28
Tetrabasic Lead Sulfate as a Paste Material For Positive Plates (Lead-Acid Battery:) 1305–19
Theorems on the Analysis of Nonlinear Transistor Networks 95–114
Theorems on the Computation of the Transient Response of Nonlinear Networks Containing Transistors and Diodes 1739–76
THEOREMS ON THE EQUATIONS OF NONLINEAR DC TRANSISTOR NETWORKS (NEW) 1713–38
THEORY AND APPROXIMATION OF BAND-LIMITED FUNCTIONS (INFORMATION) 1911–41
Thermal and Electrical Properties of Coated Conductive Substrates for Integrated Circuit Chip Mounting MATION) 1151–82
THERMAL
Gas Lens for Optical Beam Waveguides (An Improved) 137–53
Pulse Fusion Bonding (Mechanical) 1419–46
Stability 1359–76
Thin Photosensitive Materials (Device Photolithography:) 2179–92
THIN RECORDING MEDIA 2179–92
THIN-FILM
Capacitors 1013–31
Couplers (Holographic) 1602–8
Integrated Circuits 1105–49, 1997–2009
Resistors (Tantalum) 683–98
THINNING OF SILICON (ELECTROCHEMICALLY CONTROLLED) 473–5
Thomas, J. L. 721–48
Thompson, W. J. 683–98

Three-Radiometer Path-Diversity Experiment (A) 1239–42
TIME HARMONIC EXCITATIONS 1215–33
TIME-LAG CONTROL SYSTEMS 1905–9
TM MODES (TE AND) 273–90
TOLL
Simulator Set (Automatic Local) 2711–28
Switchboards 2417–43
Tompsett, M. F. 593–600
TONES (USE OF THE DISCRETE FOURIER TRANSFORM IN THE MEASUREMENT OF FREQUENCIES AND LEVELS OF) 197–228
Tong, S. Y. 477–91
TONGUE-AND-GROOVE SEAL JOINTS 1393–403
Townley, R. C. 2857–85
Traffic in Connecting Networks When Existing Calls Are Rearranged 1471–82
TRAFFIC SERVICE POSITION 2417–43
TRAFFIC SERVICE POSITION SYSTEM No. 1 2417–2730
TRAINING (PERSONNEL) 663–81
TRANSFER
Function Minimizing Distortion and Inband Lossess (A Decomposition of a) 455–69
Trace (Hardware) 2711–28
TRANSFORM IN THE MEASUREMENT OF FREQUENCIES AND LEVELS OF TONES (USE OF THE DISCRETE FOURIER) 197–228
TRANSFORMS (LAPLACE-STIELTJES) 399–413
TRANSIENT
Response Calculations 95–114
Response of Nonlinear Networks Containing Transistors and Diodes (Theorems on the Computation of the) 1739–76
TRANSISTOR
Modeling 115–20
Networks (New Theorems on the Equations of Nonlinear DC) 1713–38
Networks (Theorems on the Analysis of Nonlinear) 95–114
TRANSISTORS 631–61
(A Charge Control Relation for Bipolar) 115–20
(An Integral Charge Control Model of Bipolar) 827–52
And Diodes (Theorems on the Computation of the Transient Response of Nonlinear Networks Containing) 1739–76
Transistors, Diodes and Components (SF Submarine Cable System:) 683–98
Transit-Time Variations in Line-of-Sight Tropospheric Propagation Paths 1059–68
TRANSLATOR
(Communications Bus) 2561–623
System (Electronic) 2445–507
TRANSLATORS (MNEMONIC) 2753–829
TRANSMISSION
Alphabet (K-ary) 2267–87
And Switching Applications (Delta Modulation Codec for Telephone) 1013–31
Facilities (No. 1 ESS ADF: Teletypewriter Stations and) 2941–73
Of Holograms Using a Narrow-Band Video Signal (Television) 879–87
Systems (Digital) 2267–87
Through Rain At Microwave and Visible Frequencies (Computed) 1873–92
Transmission Tests, Computations and Equalization During Installation (SF Submarine Cable System:) 783–98
TRANSPOSE CONFIGURATIONS 159–84
TRAPATT DIODE MODE OF HIGH EFFICIENCY POWER GENERATION IN GERMANIUM AND SILICON AVALANCHE DIODES (Power-Frequency Characteristics of the) 799–826
TREE NETWORKS 229–54
TRICKEL CHARGING 1253–78

TROPOSPHERIC PROPAGATION PATHS (TRANSIT-TIME VARIATIONS IN LINE-OF-SIGHT) 1059–68
TRUNCATED PARABOLIC INDEX (DIELECTRIC GUIDE WITH CURVED AXIS AND) 1645–63
TRUNK FRAMES (UNIVERSAL) 2685–709
TSP *See* TRAFFIC SERVICE POSITION
TSPS *See* TRAFFIC SERVICE POSITION SYSTEM
TUNING OF MICROWAVE SOLID-STATE OSCILLATORS 255–72
TWIN-T DESIGN AND ITS APPLICATION TO HYBRID INTEGRATED LINEAR ACTIVE NETWORKS (A GENERAL APPROACH TO) 1105–49
TWISTED PATH CAVITIES 2311–48
TWISTORS (PIGGYBACK) 2445–507
TWO-PORTS (RC-ACTIVE) 455–69
TWO-WAY UNIFORM PARTITIONS 291–307

U

ULTRASONIC ALUMINUM DELAY LINES 2857–85
Unified Formulation of Segment Companding Laws and Synthesis of Codecs and Digital Compandors (A) 1555–88
UNIVERSAL TRUNK FRAMES 2685–709
Upper Bound on the Efficiency of dc-Constrained Codes 2267–87

V

Vaccaro, F. J. 1377–92,1405–17
VARIABLE REFLECTIVITY MIRRORS (OPTICAL RESONATORS WITH) 2349–76
VCO *See* VOLTAGE-CONTROLLED OSCILLATOR
VECTORS (NON-NEGATIVE MATRICES AND) 2267–87
VIBRATION ISOLATION 2129–43
VIBRATIONS (RANDOM) 543–60
VIBRATORY SYSTEM (ASYMPTOTIC ANALYSIS OF A NONLINEAR AUTONOMOUS) 73–80
VIDEO
Signal (Television Transmission of Holograms Using a Narrow-Band) 879–87
Simulation 321–42
VIDICON CAMERA SYSTEM 879–87
Vigants, A. 1513–30
Vincent, G. A. 197–228
VINYL CHLORIDE-PROPYLENE COPOLYMERS 1359–76
VISIBLE FREQUENCIES (COMPUTED TRANSMISSION THROUGH RAIN AT MICROWAVE AND) 1873–92
VOCAL TRACT FROM ACOUSTICAL MEASUREMENTS (DETERMINATION OF THE SHAPE OF THE HUMAN) 1195–214
VOLTAGE-CONTROLLED OSCILLATORS 2289–302
Von Roesgen, C. A. 721–48
VRM *See* VARIABLE REFLECTIVITY MIRROR

W

Waggener, H. A. 473–5
Wahl, A. J. 683–98
WAITING TIMES (QUEUES SERVED IN CYCLIC ORDER:) 399–413
Walvick, E. A. 415–29
Wannier, G. H. 343–54
Wasserstrom, E. 853–77, 1183–94
Watkins, Mrs. S. B. 2011–29
WAVES (MULTILEVEL MODULATION TECHNIQUES FOR MILLIMETER GUIDED) 33–54
WAVEGUIDE DISTORTIONS 273–90
WAVEGUIDES
(An Improved Thermal Gas Lens for Optical Beam) 137–53
And Resonators (Nonorthogonal Optical) 2311–48
(Crosstalk in Multiple-Beam) 55–71
(Dielectric) 1645–63
(Periscopic) 55–71
(Radiation Losses of Tapered Dielectric Slab) 273–90
(Radiation Losses of the Dominant Mode in Round Dielectric) 1665–93

Weber, E. W. 2752–829
Webster Horn Equation 1195–214
Weeks, M. C. 1305–19, 1335–58
Weighting Functions 197–228
Wiley, J. D. 355–78
Williams, J. R. 2915–40
Willson A. N. 1713–38
Wilson, R. W. 1239–42
Wolf, J. K. 889–909
Word Stuffing (An Asymmetric Encoding Scheme for) 379–98
Writing-Control System (PPG) 2061–7
Wurtzite 355–78

X

XYMASK 2011–29, 2077–94, 2203–20

Y

Yeh, Y. S. 1811–25, 2249–65
Yeisley, P. A. 631–61

Z

Zacharias, A. 2033–41, 2061–7, 2069–75
Zincblende 355–78
Zucker, H. 431–54, 1595–602, 2349–76
Zydney, H. M. 2752–829
100B
  Consoles 2417–43, 2561–623
  TSP Consoles 2685–709
15.3-GHz Earth-Space Propagation Study (First Result From) 1242–5
20 kHz Inverters 749–65

1970 Contents

January

Analytical Approximations to Approximations in the Chebyshev Sense	S. Darlington	1
Multilevel Modulation Techniques for Millimeter Guided Waves	W. M. Hubbard, G. D. Mandeville and J. E. Goell	33
Crosstalk in Multiple-Beam Waveguides	D. Gloge	55
Asymptotic Analysis of a Nonlinear Autonomous Vibratory System	J. A. Morrison	73
The Capacity of Linear Channels with Additive Gaussian Noise	R. K. Mueller and G. J. Foschini	81
Theorems on the Analysis of Nonlinear Transistor Networks	I. W. Sandberg	95
A Charge Control Relation for Bipolar Transistors	H. K. Gummel	115
Rain Attenuation and Radio Path Design	C. L. Ruthroff	121
An Improved Thermal Gas Lens for Optical Beam Waveguides	P. Kaiser	137

February

On the Interaction of Roundoff Noise and Dynamic Range in Digital Filters	L. B. Jackson	159
An Optimization Method for Cascaded Filters	S. Halfin	185
Measured Quantizing Noise Spectrum for Single-Integration Delta-Modulation Coders	R. R. Laane	191
Use of the Discrete Fourier Transform in the Measurement of Frequencies and Levels of Tones	D. C. Rife and G. A. Vincent	197

Reed-Contact Switch Series for the I. F. Band — M. B. Purvis and R. W. Kordos — 229

A Lumped-Circuit Study of Basic Oscillator Behavior — N. D. Kenyon — 255

Radiation Losses of Tapered Dielectric Slab Waveguides — D. Marcuse — 273

An Efficient Heuristic Procedure for Partitioning Graphs — B. W. Kernighan and S. Lin — 291

Laser Speckle Pattern—A Narrowband Noise Model — C. B. Burckhardt — 309

March

Adaptive Delta Modulation with a One-Bit Memory — N. S. Jayant — 321

On an Anomaly in the Mobility of Gaseous Ions — G. H. Wannier — 343

The Enumeration of Neighbors on Cubic and Hexagonal-Based Lattices — J. D. Wiley and J. A. Seman — 355

An Asymmetric Encoding Scheme for Word Stuffing — M. M. Buchner, Jr. — 379

Queues Served in Cyclic Order: Waiting Times — R. B. Cooper — 399

On the Capacity of an Ensemble of Channels with Differing Parameters — E. A. Walvick — 415

A Stationary Phase Method for the Computation of the Far Field of Open Cassegrain Antennas — W. H. Ierley and H. Zucker — 431

A Decomposition of a Transfer Function Minimizing Distortion and Inband Losses — E. Lueder — 455

B.S.T.J. Brief: Electrochemically Controlled Thinning of Silicon — H. A. Waggener — 473

April

Performance of Burst-Trapping Codes — S. Y. Tong — 477

Analysis of a Burst-Trapping Error Correction Procedure — W. K. Pehlert, Jr. — 493

Synthesis of Stochastic Representations of Ground Motions — S. C. Liu — 521

Limiting Behaviors of Randomly Excited Hyperbolic Tangent Systems — S. C. Liu and D. K. Cohoon — 543

Masking of Crosstalk by Speech and Noise — T. K. Sen — 561

B.S.T.J. Briefs:

Charge Coupled Semiconductor Devices — W. S. Boyle and G. E. Smith — 587

Experimental Verification of the Charge Coupled Device Concept — G. F. Amelio, M. F. Tompsett and G. E. Smith — 593

May–June

SF SUBMARINE CABLE SYSTEM

Foreword — S. T. Brewer — 601

An Overview: Requirements and Performance — C. D. Anderson and R. L. Easton — 605

Repeater and Equalizer Design — R. G. Buus, J. J. Kassig and P. A. Yeisley — 631

Manufacture of Submarine Cable Repeaters and Ocean Block Equalizers — A. T. Chapman — 663

Transistors, Diodes and Components — A. J. Wahl, W. McMahon, N. G. Lesh and W. J. Thompson — 683

Ocean Cable and Couplings — A. W. Lebert and G. J. Schaible — 699

Shore Terminal Facilities and Fault Location — R. L. Lynch, J. L. Thomas and C. A. Von Roesgen — 721

Power Conversion — E. T. Calkin and I. Golioto — 749

Submarine Cable Route Engineering **R. C. Allen, D. H. Ort and L. M. Schindel** 767

Transmission Tests, Computations and Equalization During Installation **W. B. Hirt and D. O. Oldfather** 783

* * * * *

Power-Frequency Characteristics of the TRAPATT Diode Mode of High Efficiency Power Generation in Germanium and Silicon Avalanche Diodes **D. L. Scharfetter** 799

An Integral Charge Control Model of Bipolar Transistors **H. K. Gummel and H. C. Poon** 827

The Potential Due to a Charged Metallic Strip on a Semiconductor Surface **E. Wasserstrom and J. McKenna** 853

Television Transmission of Holograms Using a Narrow-Band Video Signal **J. E. Berrang** 879

Burst Distance and Multiple-Burst Correction **J. D. Bridwell and J. K. Wolf** 889

July–August

Picturephone® Silicon Target Signal Analysis **W. E. Beadle and A. J. Schorr** 921

Image Storage and Display Devices Using Fine-Grain, Ferroelectric Ceramics **A. H. Meitzler, J. R. Maldonado and D. B. Fraser** 953

Some Mathematical Properties of a Scheme for Reducing the Bandwidth of Motion Pictures by Hadamard Smearing **E. R. Berlekamp** 969

Binary Codes Which Are Ideals in the Group Algebra of an Abelian Group **Mrs. F. J. MacWilliams** 987

Delta Modulation Codec for Telephone Transmission and Switching Applications **R. R. Laane and B. T. Murphy** 1013

On the Performance of Digital Modulation Systems That Expand Bandwidth **V. K. Prabhu** 1033

Transit-Time Variations in Line-of-Sight Tropospheric Propagation Paths **D. A. Gray** 1059

Joint Optimization of Automatic Equalization and Carrier Acquisition for Digital Communication **R. W. Chang** 1069

A General Approach to Twin-T Design and Its Application to Hybrid Integrated Linear Active Networks **G. S. Moschytz** 1105

Thermal and Electrical Properties of Coated Conductive Substrates for Integrated Circuit Chip Mounting **H. G. Mattes** 1151

The Field Singularity at the Edge of an Electrode on a Semiconductor Surface **J. A. Lewis and E. Wasserstrom** 1183

Determination of the Shape of the Human Vocal Tract from Acoustical Measurements **B. Gopinath and M. M. Sondhi** 1195

Analysis of a Thin Circular Loop Antenna Over a Homogeneous Earth **S. C. Moorthy** 1215

B.S.T.J. Briefs:

A Three-Radiometer Path-Diversity Experiment **R. W. Wilson** 1239

First Result from 15.3-GHz Earth-Space Propagation Study **A. A. Penzias** 1242

Intersymbol Interference and the P/AR Meter **J. H. Fennick** 1245

September

LEAD-ACID BATTERY

Foreword **C. G. B. Garrett** 1249

Reserve Batteries for Bell System Use: Design of the New Cell **D. E. Koontz, D. O. Feder, L. D. Babusci and H. J. Luer** 1253

Positive Grid Design Principles **A. G. Cannone, D. O. Feder and R. V. Biagetti** 1279

Tetrabasic Lead Sulfate as a Paste Material for Positive Plates **R. V. Biagetti and M. C. Weeks** 1305

Float Behavior of the Lead-Acid Battery System **P. C. Milner 1321**

Electrochemical Characterization of the Bell System Battery: Field Trials of the Battery **T. D. O'Sullivan, R. V. Biagetti and M. C. Weeks 1335**

Polyvinyl Chloride Battery Jars and Covers **T. W. Huseby, J. T. Ryan and P. Hubbauer 1359**

Electrochemical Compatibility of Plastics **A. D. Butherus, W. S. Lindenberger and F. J. Vaccaro 1377**

Jar-Cover Seals **D. W Dahringer and J. R. Shroff 1393**

Post Seals for the New Bell System Battery **L. H. Sharpe, J. R. Shroff and F. J. Vaccaro 1405**

Techniques for Bonding the Positive Plates **R. H. Cushman 1419**

Incorporating the New Battery into the Telephone Plant **H. J. Luer 1447**

****

Traffic in Connecting Networks When Existing Calls Are Rearranged **V. E. Beneš 1471**

The Flat Plate Problem for a Semiconductor **J. A. Lewis 1483**

Some Calculations on Coupling Between Satellite-Communications and Terrestrial Radio-Relay Systems Due to Scattering by Rain **L. T. Gusler and D. C. Hogg 1491**

The Number of Fades in Space-Diversity Reception **A. Vigants 1513**

Optimum Phase Equalization of Filters for Digital Signals **D. A. Shnidman 1531**

A Unified Formulation of Segment Companding Laws and Synthesis of Codecs and Digital Compandors **H. Kaneko 1555**

B.S.T.J. Briefs:

On the Computation of the Far Field of Open Cassegrain Antennas **H. Zucker 1595**

Holographic Thin Film Couplers **H. Kogelnik and T. P. Sosnowski 1602**

October

On the Distribution of Numbers **R. W. Hamming 1609**

A Mathematical Study of a Model of Magnetic Domain Interactions **R. L. Graham 1627**

Dielectric Guide with Curved Axis and Truncated Parabolic Index **E. A. J. Marcatili 1645**

Radiation Losses of the Dominant Mode in Round Dielectric Waveguides **D. Marcuse 1665**

Excitation of the Dominant Mode of a Round Fiber by a Gaussian Beam **D. Marcuse 1695**

The Capacity of the Gaussian Channel with Feedback **P. M. Ebert 1705**

New Theorems on the Equations of Nonlinear DC Transistor Networks **A. N. Willson, Jr. 1713**

Theorems on the Computation of the Transient Response of Nonlinear Networks Containing Transistors and Diodes **I. W. Sandberg 1739**

Characterization of Second-Harmonic Effects in IMPATT Diodes **C. A. Brackett 1777**

An Analysis of Adaptive Retransmission Arrays in a Fading Environment **Y. S. Yeh 1811**

Microwave Line-of-Sight Propagation With and Without Frequency Diversity **W. T. Barnett 1827**

Computed Transmission Through Rain at Microwave and Visible Frequencies **D. E. Setzer 1873**

A Linear Phase Modulator for Large Baseband Bandwidths **C. L. Ruthroff and W. F. Bodtmann 1893**

Eventual Stability for Lipschitz Functional Differential Systems **G. A. Shanholt 1905**

Information Theory and Approximation of Bandlimited Functions **D. Jagerman 1911**

A Satellite System for Avoiding Serial Sun-Transit Outages and Eclipses **C. W. Lundgren 1943**

Adaptive Predictive Coding of Speech Signals — B. S. Atal and M. R. Schroeder 1973

B.S.T.J. Brief: All Terminal Bubbles Programs Yield the Elementary Symmetric Polynomials — R. P. Kurshan 1991

November

DEVICE PHOTOLITHOGRAPHY

Foreword — F. H. Blecher 1995

An Overview of the New Mask-Making System — F. L. Howland and K. M. Poole 1997

Computer Systems for Pattern Generator Control — A. G. Gross, J. Raamot and Mrs. S. B. Watkins 2011

The Primary Pattern Generator: Introduction — K. M. Poole 2031

Part I—Optical Design — M. J. Cowan, D. R. Herriott, A. M. Johnson and A. Zacharias 2033

Part II—Mechanical Design — G. J. W. Kossyk, J. P. Laico, L. Rongved and J. W. Stafford 2043

Part III—The Control System — P. G. Dowd, M. J. Cowan, P. E. Rosenfeld and A. Zacharias 2061

Part IV—Alignment and Performance Evaluation — A. M. Johnson and A. Zacharias 2069

The Electron Beam Pattern Generator — W. Samarro, J. Raamot, P. Parry and G. Robertson 2077

Electron-Sensitive Materials — B. Broyde 2095

Lenses for the Photolithographic System — D. R. Herriott 2105

Reduction Cameras: Optical Design and Adjustment — E. G. Rawson 2117

Mechanical Design of the 3.5X and 1.4X Reduction Cameras — M. E. Poulsen and J. W. Stafford 2129

The Step-and-Repeat Camera
D. S. Alles, J. W. Elek, F. L. Howland, B. Nevis, R. J. Nielsen, W. A. Schlegel, J. G. Skinner and C. E. Stout, Jr. 2145

Thin Photosensitive Materials **R. E. Kerwin 2179**

A Computer Controlled Coordinate Measuring Machine **F. R. Ashley, Miss E. B. Murphy and H. J. Savard, Jr. 2193**

The Mask Shop Information System
Mrs. J. G. Brinsfield and S. Pardee 2203

****

Response of Periodically Varying Systems to Shot Noise—Application to Switched RC Circuits **S. O. Rice 2221**

A New Approach for Evaluating the Error Probability in the Presence of Intersymbol Interference and Additive Gaussian Noise **E. Y. Ho and Y. S. Yeh 2249**

Upper Bound on the Efficiency of dc-Constrained Codes
T. M. Chien 2267

Pull-In Range of a Phase-Locked Loop With a Binary Phase Comparator **J. F. Oberst 2289**

A Fast Method of Generating Digital Random Numbers
C. M. Rader, L. R. Rabiner and R. W. Schafer 2303

Nonorthogonal Optical Waveguides and Resonators
J. A. Arnaud 2311

Optical Resonators With Variable Reflectivity Mirrors
H. Zucker 2349

Projecting Filters for Recursive Prediction of Discrete-Time Processes **A. Gersho and D. J. Goodman 2377**

December

TSPS No. 1

System Organization and Objectives
R. J. Jaeger, Jr., and A. E. Joel, Jr. 2417

Stored Program Control No. 1A **G. R. Durney, H. W. Kettler, E. M. Prell, G. Riddell and W. B. Rohn** 2445

Stored Program Control No. 1A Store **W. A. Baker, G. A. Culp, G. W. Kinder and F. H. Myers** 2509

Peripheral Circuits **W. K. Comella, C. M. Day, Jr., and J. A. Hackett** 2561

Operational Programs **A. W. Kettley, E. J. Pasternak and M. F. Sikorsky** 2625

Physical Design **W. R. Baldinger and G. T. Clark** 2685

System Testing **K. A. Heller, D. A. Schmitt and R. M. Taylor** 2711

No. 1 ESS ADF

System Organization and Objectives **J. C. Ewin and P. K. Giloth** 2733

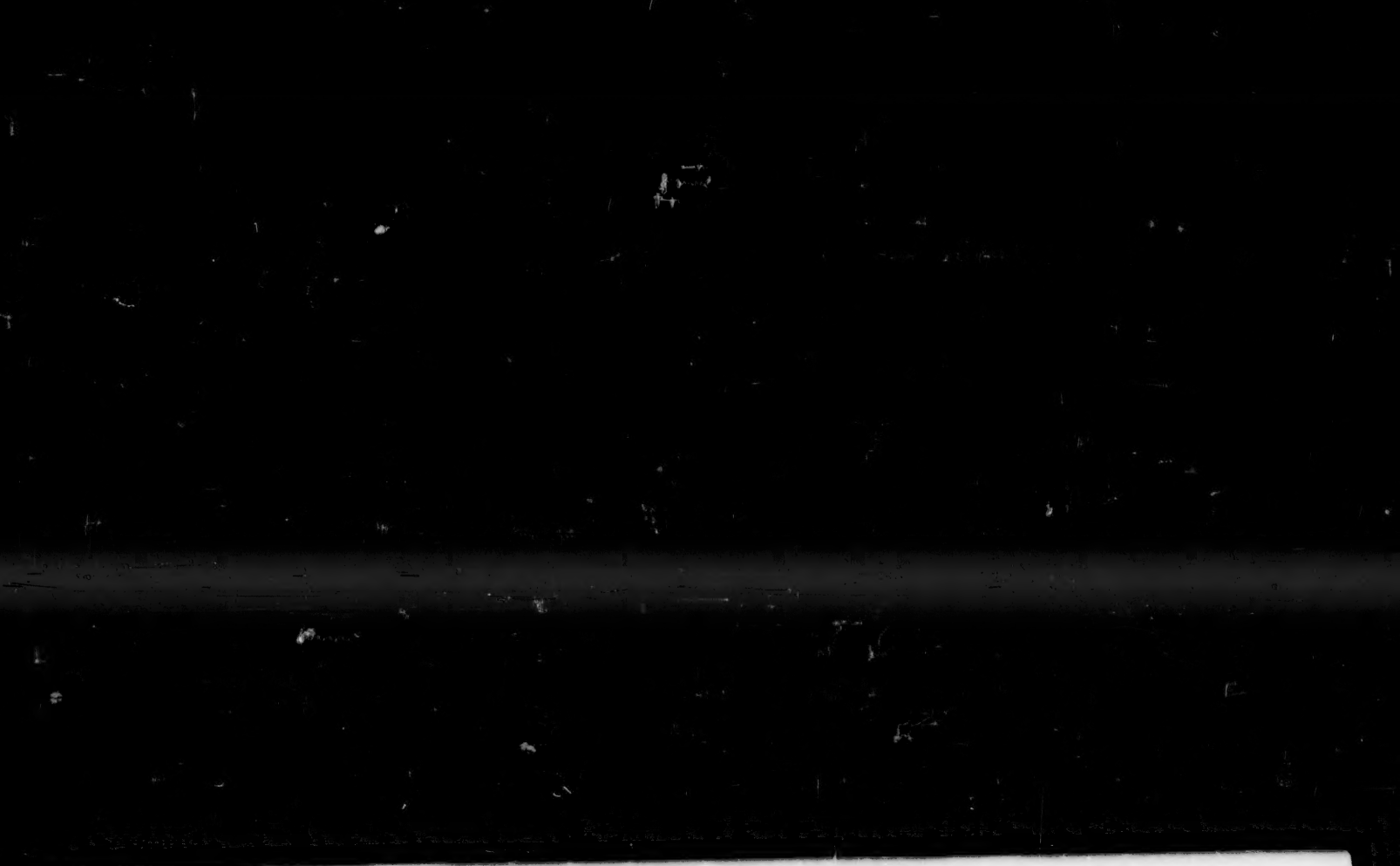
Message Processing Program Organization **H. G. Kienzle, K. L. Nicodemus, M. T. Smith, Jr., E. W. Weber and H. M. Zydney** 2753

Maintenance Plan **E. J. Aitcheson and R. F. Cook** 2831

Autonomous Data Scanner and Distributor **J. E. Corbin, H. R. Lehman and R. C. Townley** 2857

Message Store—A Disk Message System **E. J. Aitcheson, C. F. Ault and R. G. Spencer** 2887

Magnetic Tape Subsystem **J. L. Potter, Mrs. F. B. Strebendt and J. R. Williams** 2915

Teletypewriter Stations and Transmission Facilities **A. C. Carney, S. M. Fitch and G. Parker** 2941

System Testing and Early Field Operation Experience **D. R. Barney, P. K. Giloth and H. G. Kienzle** 2975